12:49:57

1   IN THE UNITED STATES DISTRICT COURT

2   FOR THE EASTERN DISTRICT OF TEXAS

3   MARSHALL DIVISION

4   VOCALIFE LLC,   )(

5   PLAINTIFF,   )(CIVIL ACTION NO.

6   )(2:19-CV-123-JRG

7   VS.   )(MARSHALL, TEXAS

8   )(

9   AMAZON.COM, INC. and   )(

10   AMAZON.COM LLC,   )(OCTOBER 2, 2020

11   DEFENDANTS.   )(12:49 P.M.

12   TRANSCRIPT OF JURY TRIAL

13   AFTERNOON SESSION

14   BEFORE THE HONORABLE JUDGE RODNEY GILSTRAP

15   UNITED STATES CHIEF DISTRICT JUDGE

16

17   FOR THE PLAINTIFF:

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   |
24 | (Proceedings recorded by mechanical stenography, transcript
   | produced on a CAT system.)
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	1	P R O C E E D I N G S
12:49:57	2	(Jury out.)
12:49:57	3	COURT SECURITY OFFICER: All rise.
12:49:58	4	THE COURT: Be seated, please.
12:50:01	5	Plaintiff, are you prepared to call your next
12:50:09	6	witness?
12:50:09	7	MR. BAXTER: Yes, Your Honor, we are.
12:50:10	8	THE COURT: All right. Let's bring in the jury,
12:50:12	9	please, Mr. Johnston.
12:50:21	10	COURT SECURITY OFFICER: All rise.
12:50:29	11	(Jury in.)
12:50:39	12	THE COURT: Please be seated.
12:50:45	13	Plaintiff, call your next witness.
12:50:51	14	MR. BAXTER: Thank you, Your Honor.
12:50:52	15	Plaintiff calls Dr. Manli Zhu, please.
12:50:55	16	THE COURT: All right.
12:50:56	17	MR. BAXTER: Come forward, Doctor.
12:50:58	18	THE COURT: If you'll come forward and be sworn,
12:51:01	19	please.
12:51:01	20	(Witness sworn.)
12:51:03	21	THE COURT: Please come around, have a seat on the
12:51:17	22	witness stand.
12:51:18	23	Once you're seated and situated, if you would
12:51:22	24	please remove your mask.
12:51:29	25	All right. Mr. Baxter, you may proceed with your

12:51:37	1	direct examination.
12:51:38	2	MR. BAXTER: Thank you, Your Honor.
12:51:38	3	MANLI ZHU, PH.D., PLAINTIFF'S WITNESS, SWORN
12:51:38	4	DIRECT EXAMINATION
12:51:42	5	BY MR. BAXTER:
12:51:42	6	Q. Would you introduce yourself to the ladies and
12:51:44	7	gentlemen of the jury, please?
12:51:44	8	A. Good afternoon, everyone. My name is Manli Zhu. Yes.
12:51:47	9	Q. Spell your last name for the court reporter, if you
12:51:49	10	would, please, Doctor.
12:51:50	11	A. Okay. My last name is spelled as Z, as zero, H, as
12:51:54	12	house, U, as universe, pronounced as Zhu, yes.
12:51:57	13	Q. So I'm going to try to say it right and call you
12:52:01	14	Dr. Zhu the whole afternoon long, if it's okay?
12:52:04	15	A. Yeah, that's okay.
12:52:05	16	Q. Have you ever testified before, Doctor?
12:52:07	17	A. No, it's my first one.
12:52:09	18	Q. Are you nervous?
12:52:09	19	A. Yes.
12:52:09	20	Q. Are you worried about understanding my accent because
12:52:11	21	it's a little hard to follow sometimes?
12:52:13	22	A. Yes.
12:52:14	23	Q. Okay. I promise you I'm going to try to speak slowly.
12:52:18	24	And if you will do the same and then speak loudly.
12:52:23	25	A. Yes, I will speak loudly and slowly.

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12:52:26   1   Q.   All right.  Doctor, we'll get along fine then.

12:52:29   2             Tell me where you're from, please.

12:52:31   3   A.   I'm from -- I live in New City, New York, yeah.

12:52:34   4   Q.   And that's New City.  How big is New City?

12:52:38   5   A.   New City is a town in Upstate New York about 33,000

12:52:42   6   populations, yeah.

12:52:43   7   Q.   Are you married, ma'am?

12:52:44   8   A.   Yes, I'm married.

12:52:46   9   Q.   And what does your husband do?

12:52:49   10  A.   My husband is an optical engineer.

12:52:51   11  Q.   Is he a doctor, as well?

12:52:53   12  A.   Yeah, he got his Ph.D. degree.

12:52:56   13  Q.   Okay.  Do you have any children?

12:52:57   14  A.   I have two boys.

12:53:00   15  Q.   How old are they?

12:53:01   16  A.   One is 12, one is eight.

12:53:03   17  Q.   Well, I'm sorry about the 12-year-old.  How -- how is

12:53:06   18  school coming?  Have they started school?

12:53:08   19  A.   Yes, they start learning since beginning of September,

12:53:13   20  and actually, this week, started Wednesday, they started

12:53:16   21  hybrid.

12:53:17   22  Q.   And what are your boys interested in, Doctor?

12:53:20   23  A.   Both of my boys interested in basketball.

12:53:27   24  Q.   Okay.  Tell me where you were born and a little about

12:53:31   25  your educational background, please.
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12:53:32 1   A.   Okay.   I was born in China.   And I got my Bachelor's

12:53:35 2   and my Master's degree both in China in the area of

12:53:40 3   electrical engineering.

12:53:41 4   Q.   Tell me, Dr. Zhu, how many women were in the program

12:53:47 5   when you enrolled in college, in engineering?

12:53:50 6   A.   In my undergraduate study, there were about 60 students

12:53:58 7   in my class, and there are seven girls.

12:54:03 8   Q.   Okay.   Is it a little tough for girls to get into

12:54:06 9   engineering in college in China?

12:54:07 10 A.   Yeah, we are in minority in engineering.

12:54:11 11 Q.   Okay.   When you graduated with your Bachelor's degree,

12:54:14 12 tell me where you were in the class?

12:54:16 13 A.   Oh, I -- I was ranked No. 1 in my class.

12:54:21 14 Q.   Okay.   Did you then go to graduate school?

12:54:23 15 A.   Yeah, I went to graduate school in the same university.

12:54:27 16 Q.   And what was your field of study in graduate school,

12:54:30 17 Doctor?

12:54:30 18 A.   My field is in pattern recognition and looking for

12:54:36 19 object detection and tracking object.

12:54:39 20 Q.   Is that pattern recognition?

12:54:41 21 A.   Yes.

12:54:47 22 Q.   After you got your Master's what was your decision to

12:54:51 23 do about continuing your education?   What did you do?

12:54:53 24 A.   Yeah, I want to pursue my Ph.D. degree in the best

12:54:58 25 graduate -- get the best graduate education in the world.

12:55:02	1	Q. And where did you think that might be?
12:55:04	2	A. That's in the U.S.
12:55:08	3	Q. Did you apply to graduate schools in the U.S.?
12:55:11	4	A. Yes, I did.
12:55:12	5	Q. What did you have to do to apply to graduate school?
12:55:14	6	A. You need to take several exams, including English as
12:55:20	7	second language. Another exam is graduate entrance exam
12:55:26	8	called GRE.
12:55:27	9	Q. Did you take that exam?
12:55:28	10	A. Yeah, you have to take that exam.
12:55:33	11	Q. What is the most you can make on the GRE?
12:55:37	12	A. Is 2400.
12:55:38	13	Q. What did you make?
12:55:40	14	A. I make 2380.
12:55:40	15	Q. 2380?
12:55:40	16	A. Yes.
12:55:41	17	Q. You missed a question?
12:55:41	18	A. I missed one question.
12:55:42	19	Q. Do you know what it was?
12:55:42	20	A. I don't know. I have no idea.
12:55:44	21	Q. Okay. So you took that. How did you do with English
12:55:51	22	as a second language?
12:55:52	23	A. In China we start to learn English starting middle
12:55:57	24	school, but it most focus on reading and writing.
12:55:59	25	Q. So the English that you learned was primarily how to

12:56:03	1	read the written page?
12:56:04	2	A. Yes.
12:56:04	3	Q. And how to write a paper?
12:56:06	4	A. Yes.
12:56:06	5	Q. What about verbal communication, either saying English
12:56:09	6	or understanding English?
12:56:11	7	A. We have very limited training on that back in China.
12:56:15	8	Q. Did you get into graduate school in the United States?
12:56:17	9	A. Yeah, we got into graduate school in United States.
12:56:22	10	Q. Okay. And you say "we"?
12:56:24	11	A. Yeah, sorry.
12:56:25	12	Q. Was there anybody else involved?
12:56:26	13	A. Yeah, because me and my husband -- at that time my
12:56:31	14	boyfriend -- we applied at the same time.
12:56:32	15	Q. Okay.
12:56:33	16	A. Yeah.
12:56:33	17	Q. And you got into what school?
12:56:36	18	A. I got into the Ohio State University.
12:56:39	19	Q. In Columbus, Ohio?
12:56:41	20	A. In Columbus, Ohio.
12:56:42	21	Q. In the engineering department?
12:56:43	22	A. Yes.
12:56:43	23	Q. And he got into what school?
12:56:46	24	A. He got into University of Arizona.
12:56:48	25	Q. Okay. So you got into the Ohio State, and he had to go

12:56:51	1	to Arizona?
12:56:52	2	A. Yes.
12:56:52	3	Q. Okay. Was there a time later on when you came to the
12:56:56	4	United States and started graduate studies?
12:56:59	5	A. May I pardon your question?
12:57:03	6	Q. Yes, ma'am. Did you come and enroll in Ohio State?
12:57:06	7	A. Yes.
12:57:06	8	Q. Okay. Did you have the finances to pay for your
12:57:11	9	education in the United States?
12:57:12	10	A. Yeah. Both of us get merit-based scholarship, yeah, so
12:57:20	11	that's how we support ourselves in university.
12:57:22	12	Q. Okay. So you got a merit-based scholarship?
12:57:26	13	A. Yeah.
12:57:27	14	Q. And you worked on your Ph.D.?
12:57:28	15	A. Yes.
12:57:28	16	Q. In what?
12:57:29	17	A. In the area of electrical engineering.
12:57:31	18	Q. How did you go about improving your English, Dr. Zhu?
12:57:38	19	A. Yeah, it -- it was a tough time at that time, and
12:57:42	20	because I had a difficulty to understand people in the
12:57:48	21	normal conversation and speak out the word, it's hard.
12:57:52	22	So I tried to talk to people in the grocery store,
12:57:58	23	and when the utility guy call on the phone. And I try to
12:58:02	24	improve my language in that conversation. And we watched
12:58:06	25	TVs. So that's how we improve our oral conversation.

12:58:10 1 Q. Can you really learn a foreign language by watching TV?

12:58:16 2 A. That's part of the lessons.

12:58:19 3 Q. Okay. And pretty soon were you able to converse with

12:58:22 4 people in English?

12:58:23 5 A. Yes, gradually. And I appreciate my professors'

12:58:28 6 patience on me, too.

12:58:29 7 Q. What were you working on besides your Ph.D.? Were you

12:58:33 8 working on a research project at Ohio State University?

12:58:36 9 A. Yes.

12:58:36 10 Q. What sort of projects were you working on?

12:58:38 11 A. My Ph.D. thesis is about study on generalized

12:58:46 12 eigenvalue decomposition in discriminant analysis. Yeah,

12:58:52 13 this complicate, it was. But say it in a simple way is try

12:58:54 14 to looking for the best features in the data that can

12:58:57 15 differentiate the data from each other.

12:59:01 16 Q. Okay.

12:59:01 17 A. Yeah.

12:59:01 18 Q. So you were dealing with a data set, and you wanted the

12:59:04 19 data set to be able to differentiate?

12:59:07 20 A. Yeah.

12:59:07 21 Q. Various either speech patterns or digital patterns or

12:59:12 22 things of that ilk?

12:59:13 23 A. Yeah, the data is in a general form. It can be radio,

12:59:16 24 it can be image, it can be signal speech. Yeah, it's a

12:59:19 25 very general theoretical study.

12:59:22	1	Q. Did you get your Ph.D., Doctor?
12:59:25	2	A. Yes, I got my Ph.D.
12:59:26	3	Q. How long did that take?
12:59:27	4	A. About four years.
12:59:29	5	Q. Okay. Along the way, what happened to the boyfriend?
12:59:32	6	A. What happened to --
12:59:35	7	Q. The boyfriend that came to Arizona?
12:59:37	8	A. Yeah, he studied in University of Arizona. And so we
12:59:43	9	decided to get -- get married in 2005, yeah, we got --
12:59:50	10	yeah.
12:59:50	11	Q. What year did you graduate from Ohio State with your
12:59:55	12	Ph.D.?
12:59:55	13	A. 2006.
12:59:57	14	Q. Okay. What did you do then, Doctor?
12:59:59	15	A. At that time, my husband haven't graduated yet, so I
01:00:04	16	went to Arizona to join him because we decided we want to
01:00:10	17	end the long distance.
01:00:11	18	So I waited for him graduate, and he got a job
01:00:16	19	offer on East Coast. So we fly -- we flew together to East
01:00:20	20	Coast, and then I started to look for my job.
01:00:23	21	Q. Okay. So he had a job on the East Coast?
01:00:25	22	A. Yes.
01:00:25	23	Q. And you're now looking for a job?
01:00:27	24	A. Yes.
01:00:27	25	Q. Did you find one?

01:00:28	1	A. Yeah, I found one.
01:00:29	2	Q. What is it?
01:00:30	3	A. That's Dr. Peter Li's company called Li Creative
01:00:33	4	Technologies.
01:00:33	5	Q. This Dr. Peter Li that's here at counsel table?
01:00:39	6	A. Yes.
01:00:39	7	Q. You went to work for his company?
01:00:40	8	A. Yes.
01:00:41	9	Q. Okay. What was your job at his company, Doctor?
01:00:44	10	A. Yeah, at Li Creative Technologies, I developed
01:00:48	11	algorithm and implemented code related to audio signal.
01:00:53	12	Q. All right. I meant to ask you before, did somewhere
01:00:57	13	along the way, were you able to apply for a U.S.
01:01:00	14	citizenship?
01:01:01	15	A. Yes.
01:01:01	16	Q. And are you a United States citizen?
01:01:04	17	A. Now I'm a proud U.S. citizen.
01:01:07	18	Q. Okay. That also make you a proud Buckeye?
01:01:10	19	A. Yes, come from Ohio State Buckeyes.
01:01:13	20	Q. Okay. Do you know what a Buckeye is?
01:01:15	21	A. I know.
01:01:16	22	Q. Okay. So you apply for a job with Dr. Li. And does he
01:01:22	23	give it to you?
01:01:23	24	A. Can you pardon your question?
01:01:26	25	Q. Did he give you a job? Did you go to work for him?

01:01:30   1   A.   Yes, I got a job at Li Creative Technologies.

01:01:32   2   Q.   And what was your job at Creative Technologies?

01:01:36   3   A.   My first project in Li Creative Technologies is related

01:01:40   4   to the speech recognition.   And at end of '07, I had my

01:01:46   5   maternity leave.

01:01:49   6   Q.   Maternity?

01:01:50   7   A.   Yes.

01:01:51   8   Q.   Okay.

01:01:52   9   A.   When I came back, I started to work on the microphone

01:01:56   10   array technology for the far-field application.

01:01:58   11   Q.   So you had your first child?

01:02:00   12   A.   Yes, I had my first child back then.

01:02:03   13   Q.   Did -- did the research that you were doing ever turn

01:02:06   14   into any sort of product?

01:02:11   15   A.   We -- pardon your question, please?

01:02:16   16   Q.   Yes.   The research that you were doing on speech

01:02:19   17   recognition and patterns, did it ever turn into an actual

01:02:22   18   product?

01:02:23   19   A.   The speech recognition --

01:02:24   20   Q.   Yes, ma'am.

01:02:25   21   A.   -- project?   No, it -- it was a prototype.

01:02:29   22   Q.   Okay.

01:02:29   23   A.   Yeah.

01:02:29   24   Q.   Did you, in fact, though, build a prototype?   Was there

01:02:36   25   a prototype ever built?

01:02:37   1   A.   Yes.

01:02:38   2   Q.   Okay.   What was it called?

01:02:40   3   A.   Pardon your question?   Which project are -- you refer

01:02:44   4   to?

01:02:45   5   Q.   Well, the very first one --

01:02:47   6   A.   Yeah.

01:02:48   7   Q.   -- did it -- either before the maternity leave or

01:02:52   8   after --

01:02:52   9   A.   Yeah.

01:02:53   10   Q.   -- did it ever turn into a prototype product?

01:02:56   11   A.   Yeah, most of the them -- the project I talked about

01:03:00   12   went to prototype.   There's no product.

01:03:03   13   Q.   Okay.

01:03:04   14   A.   Yeah.

01:03:04   15   Q.   All right.   When you started working for Dr. Li, were

01:03:09   16   you working -- I think you said, on -- on pattern

01:03:12   17   recognition; is that right?

01:03:16   18   A.   The first project I worked for Li Creative Technology

01:03:19   19   is in the area of pattern recognition.   It's related to

01:03:23   20   speech recognition.

01:03:23   21   Q.   Okay.   Can you tell the ladies and gentlemen of the

01:03:27   22   jury what a microphone array is?

01:03:28   23   A.   Microphone array is different from a single microphone.

01:03:35   24   Microphone array is a number of microphones.   We configure

01:03:39   25   them to working together, so the sound come from some

01:03:44   1 specific directions can be enhanced and the sound come from

01:03:47   2 other directions can be suppressed. So that is microphone

01:03:50   3 array technology.

01:03:51   4 Q. When you say the sound is suppressed, what do you mean?

01:03:54   5 A. Suppressed means we want to reduce -- reduce the volume

01:04:00   6 of the background noise, and that's the background noise we

01:04:04   7 want to suppress.

01:04:06   8   And the enhance, we want to enhance the primary

01:04:10   9 talker's voice, yeah.

01:04:11   10 Q. If you have multiple microphones, does it make any

01:04:15   11 difference about how they're arranged?

01:04:19   12 A. Yes.

01:04:19   13 Q. Tell the ladies and gentlemen of the jury the

01:04:21   14 difference, please, ma'am.

01:04:22   15 A. Okay. Now, pardon your question, please?

01:04:25   16 Q. Yes, ma'am. Tell them how microphones can be arranged.

01:04:30   17 Are there various ways?

01:04:31   18 A. Yeah, there are different ways you can arrange your

01:04:34   19 microphone. You can arrange them in linearship, so all the

01:04:41   20 microphone com -- components in a straight line. And you

01:04:42   21 can also lay out them in a circular shape or a rectangle

01:04:49   22 shape. There are different ways you can lay out microphone

01:04:53   23 components.

01:04:53   24 Q. Did you also work on an idea that's called far-field

01:04:57   25 application?

01:04:57   1   A.   Yes.

01:04:58   2   Q.   Tell the ladies and gentlemen what that is, please.

01:05:00   3   A.   Okay.   Far-field application is compared with the

01:05:11   4   near-field application.   Near-field means when you are

01:05:13   5   talking to the microphone, you hold very closely to the

01:05:16   6   microphone.   So your voice is the primary sound.   All the

01:05:19   7   background noise is relatively low compared to your own

01:05:23   8   voice.   Like I'm talking to the goose -- gooseneck

01:05:25   9   microphone, that's close-talk microphone.

01:05:27   10   So as a comparison, far-field microphone means you

01:05:31   11   talk to the microphone at distance, like when we have the

01:05:34   12   Zoom meeting now, everybody has Zoom meeting for the

01:05:37   13   students.   And so you're talking at distance from the

01:05:40   14   microphone, yeah.

01:05:41   15   Q.   Are -- right now when you're speaking into that

01:05:43   16   microphone, is that near-field?

01:05:46   17   A.   Yeah, that's near-field microphone.

01:05:49   18   Q.   Can you show me far-field?

01:05:51   19   A.   Far-field is like very -- conference phone call, yeah.

01:05:54   20   Q.   And why were you working on that?

01:05:56   21   A.   Because, as I just said, when you're talking close to

01:06:01   22   the microphone, your voice is the primary sound.

01:06:05   23   Background noise was hardly picked up compared to your own

01:06:09   24   voice.   But when you talk far away from the microphone,

01:06:12   25   your voice -- it's just as important as any other sound.

01:06:15 1   So the microphone pick up not only your voice and

01:06:19 2   any sound in the room, but we still want people on

01:06:23 3   the other the side of the line -- that's clearly what you

01:06:26 4   say. We need to suppress all this background noise. So

01:06:30 5   that's why I make this technology important.

01:06:33 6   Q. In order to do that, what did you have to do to

01:06:39 7   suppress background noise and emphasize the direct speaker

01:06:44 8   voice, even no matter where that speaker was in the room?

01:06:47 9   What did you have to do?

01:06:48 10 A. Yeah, we had to develop -- develop our algorithm

01:06:52 11 starting from very physic -- physic study, how the sound

01:06:56 12 propagate to the microphone. Then we come out with

01:06:59 13 formulations to suppress the sound coming from other

01:07:02 14 direction. And -- okay, yeah.

01:07:07 15 Q. Now, I think you used the word "algorithm." Did I say

01:07:10 16 that right?

01:07:10 17 A. Yes.

01:07:11 18 Q. Tell them what an algorithm is, please.

01:07:13 19 A. Algorithm is like mathematical recipe. So mathematical

01:07:19 20 step-by-step tell us how do you process a signal, yeah.

01:07:23 21 Q. And so if I were to put it in my terms, it would be

01:07:27 22 first you put in the water and the flour, and later you

01:07:32 23 throw in the egg?

01:07:33 24 A. Yeah. You can understand algorithms in this way, but

01:07:36 25 it's mathematical step instead of ingredients.

01:07:40   1   Q.   All right.   Instead of ingredients, it's one

01:07:42   2   mathematical step after another?

01:07:44   3   A.   Yes.

01:07:44   4   Q.   And did you start writing algorithms to work on the

01:07:47   5   far-field technology?

01:07:47   6   A.   Yeah, we started to develop our algorithms, and we have

01:07:50   7   to write source code to implement -- to realize that.

01:07:56   8   Q.   Okay.   Just so we're all on the same page, tell the

01:08:00   9   ladies and gentlemen what source code is?

01:08:02   10   A.   Source code is the -- the language a computer can

01:08:05   11   understand, yeah.

01:08:06   12   Q.   And did you start writing source code?

01:08:09   13   A.   Yes.

01:08:09   14   Q.   Are there various languages that you can use to write

01:08:13   15   source code?

01:08:13   16   A.   Yeah, there are lots of languages.   And, specifically,

01:08:18   17   I used several language, MATLAB, C, C++.   And, yeah, so

01:08:25   18   that's the primary language I used.

01:08:27   19   Q.   So in addition to Chinese and English, you speak all

01:08:32   20   kinds of computer languages?

01:08:33   21   A.   Yes.

01:08:33   22   Q.   All right.   Did you write source code?

01:08:35   23   A.   Yeah, I wrote source code.

01:08:36   24   Q.   And if the -- how long did it take you to come up with

01:08:41   25   a solution of the far-field problem, Doctor?

01:08:43   1   A. Yeah, for the specific project I have been working on,

01:08:50   2   we spend about two years. Starting from the algorithm

01:08:52   3   development to implement the source code on the right

01:08:58   4   platform and get the working functional prototype, it's

01:09:02   5   about two years.

01:09:03   6   Q. And what years were those?

01:09:04   7   A. It's '08 and '09.

01:09:08   8   Q. Okay. When you finally got the problem solved, was

01:09:13   9   there a particular microphone array that you used?

01:09:16 10   A. Yeah. The beauty of our invention is it can work on

01:09:23 11   different layout of the microphone, but for the demo system

01:09:26 12   we used, we use a circular microphone array -- means all

01:09:32 13   the microphone components work in a circular shape.

01:09:35 14   Q. How many microphones did you use?

01:09:37 15   A. I used eight microphone components.

01:09:38 16   Q. And they were in a circle?

01:09:40 17   A. Yeah, they were in circle.

01:09:41 18   Q. Okay. Let me ask you about another term that I think

01:09:45 19   the jury has heard about, and that's adaptive beamforming.

01:09:49 20   A. Yes.

01:09:50 21   Q. Can you give us your definition of what adaptive

01:09:53 22   beamforming is, please, ma'am?

01:09:54 23   A. Yeah. And when we want to work on the microphone array

01:09:59 24   technology, we want to -- the microphone can focus the

01:10:02 25   sound coming from some directions. That too means --

01:10:08 1 Q.   Can I stop you right there before you get to adaptive?

01:10:10 2 A.   Yes.

01:10:11 3 Q.   Is -- is that sort of the straight-on definition of

01:10:14 4 beamforming -- before we get to adaptive?

01:10:16 5 A.   Okay. Yeah, beam -- yeah, beamforming is what I just

01:10:21 6 decide we want to focus the sound coming from specific

01:10:23 7 directions. And adaptive beamforming means the -- the --

01:10:27 8 the microphone array can focus on whatever the sound coming

01:10:31 9 from. It's a dynamic process, yeah.

01:10:34 10 Q.   Is there also a term called sound source localization?

01:10:39 11 A.   Yes.

01:10:39 12 Q.   Tell the jury what that is, please, ma'am.

01:10:42 13 A.   The sound source localization will locate the sound,

01:10:45 14 where does it come from.

01:10:47 15 Q.   And why is that important?

01:10:48 16 A.   Because the application of our invention is we don't

01:10:55 17 want to fix the people's position when they talk into the

01:10:58 18 microphone. All -- in a conference situation, you don't

01:11:02 19 want to fix the location of the primary talker. You want

01:11:04 20 the -- we -- we want to track the primary talker, even his

01:11:09 21 moving.

01:11:09 22 Q.   So you developed a product that had adaptive

01:11:15 23 beamforming; is that right?

01:11:16 24 A.   Yes.

01:11:16 25 Q.   And had sound source localization?

01:11:18   1   A.   Yes.

01:11:18   2   Q.   And had noise reduction or suppression?

01:11:23   3   A.   Yes.   We also continued it.   Yeah, we also had noise

01:11:27   4   reduction, too.

01:11:28   5   Q.   Did the source code and the algorithms that you used,

01:11:32   6   does that only work if you have a circle?

01:11:36   7   A.   No, it doesn't have to be a circle.   Like I said, the

01:11:41   8   invention we did is it can work with different kind of

01:11:46   9   layout of the microphone.

01:11:48   10   Q.   Will you tell the jury what a processor is, please,

01:11:51   11   ma'am?

01:11:51   12   A.   Yeah.   A processor is a chip that can carry all the

01:11:56   13   computations, yeah.

01:11:57   14   Q.   What -- what does a processor do?

01:11:59   15   A.   The -- in our application, we want the processor can do

01:12:05   16   all the calculations we need to process the signal.

01:12:08   17   Q.   Does it need to be fast or slow?

01:12:10   18   A.   Yeah, it has to be fast enough to make sure all the

01:12:14   19   algorithms can be implemented in -- close to real-time.

01:12:18   20   Q.   Did you find one that would do that?

01:12:20   21   A.   Yeah.   In our demo, we -- we end up using the ARM chip

01:12:27   22   to run our code.

01:12:27   23   Q.   Is that an A-R-M chip?

01:12:29   24   A.   Yes.

01:12:30   25   Q.   Called an ARM chip?

01:12:31	1	A. Yes.
01:12:31	2	Q. Okay. Was it fast enough?
01:12:33	3	A. Yeah, it's fast enough to run our code.
01:12:35	4	Q. And so how did -- how did the processor end up
01:12:41	5	interacting with the microphones?
01:12:43	6	A. The -- the processor take inputs, yeah. There are
01:12:47	7	some -- there's a layer between microphone components and
01:12:50	8	the processor because microphone signal is analog. We need
01:12:58	9	the -- like a -- analog-to-digital processor to put the
01:13:01	10	signal in that fit into the processor, yeah.
01:13:06	11	Q. Did you get it to work?
01:13:07	12	A. Yeah, I got it to work. Yeah.
01:13:09	13	Q. Okay.
01:13:12	14	MR. BAXTER: Let me see if I can get PX-258.
01:13:30	15	Q. (By Mr. Baxter) Can you identify what's been marked as
01:13:32	16	Exhibit PX-258, Doctor?
01:13:34	17	A. Yeah, this is the VoiceFocus. Yeah.
01:13:35	18	Q. Okay. I notice on -- was this a document put out by
01:13:39	19	your company?
01:13:40	20	A. Yes.
01:13:42	21	Q. Okay. I notice it's got a -- what looks like an award.
01:13:47	22	Can you tell the ladies and gentlemen what that is, please?
01:13:51	23	A. This is a design award we got in 2011, CES.
01:13:58	24	Q. And what is the CES?
01:14:01	25	A. CES is Consumer Electronics Show. It's a big tech

01:14:06   1   event. Has been there about -- more than decades, yeah.

01:14:10   2   Q. Okay. It's not just big, it's the biggest in the

01:14:14   3   world, isn't it?

01:14:14   4   A. Yeah, it's international. It brings -- all the big

01:14:16   5   small tech companies will bring their bricks and

01:14:21   6   technologies to this show.

01:14:22   7   Q. Did you take the technology or did Dr. Li take the

01:14:25   8   technology to the show?

01:14:26   9   A. Yeah, I didn't go to that event. Dr. Li went there.

01:14:30   10 Q. And what prize and award did you come off with?

01:14:32   11 A. It's -- it's a design award.

01:14:35   12 Q. So they gave you an award for having the best design in

01:14:42   13 the world at that electronics show?

01:14:43   14 A. Yes, yes.

01:14:44   15 Q. Were you happy about that?

01:14:45   16 A. Yeah, we feel honored because that's international

01:14:49   17 event, yeah.

01:14:50   18 Q. Now, do you know what year that marketing material came

01:14:58   19 out?

01:14:59   20 A. I think it's -- I saw --

01:15:02   21   MR. BAXTER: Can we look at the bottom?

01:15:04   22 A. Yeah, it's 2011.

01:15:06   23 Q. (By Mr. Baxter) Okay. Now, you're an inventor on the

01:15:20   24 '049 patent, are you not, Doctor?

01:15:22   25 A. Can you pardon me, please?

01:15:23   1   Q.   Yes, ma'am.   I'm sorry, I changed topics on you.

01:15:26   2   A.   Okay.

01:15:27   3   Q.   Are you an inventor on the '049 patent?

01:15:29   4   A.   Yes.

01:15:30   5   Q.   Okay.   And who else is named as an inventor?

01:15:32   6   A.   Dr. Peter Li.

01:15:34   7   Q.   Okay.

01:15:36   8   MR. BAXTER: Can we get the '049 up?   I think

01:15:37   9   that -- there we go.

01:15:39 10   Q.   (By Mr. Baxter)   Is that your -- is that the patent

01:15:42 11   that's the subject of this lawsuit, the '049?

01:15:43 12   A.   Yes.

01:15:44 13   Q.   And are you one of the inventors?

01:15:46 14   A.   Yes.

01:15:50 15   Q.   Okay.   And who else is an inventor, anybody?

01:15:53 16   A.   Dr. Peter Li.

01:15:55 17   Q.   Okay.   What would you say your contribution to the '049

01:15:59 18   was, Doctor?

01:16:00 19   A.   I -- I draft a white paper based on the technology we

01:16:06 20   developed in Li Creative Technologies, yeah.

01:16:08 21   Q.   Okay.   Now, this patent, I think the jury has heard, is

01:16:13 22   a reissue patent.   Do you know about that?

01:16:14 23   A.   Yes.

01:16:15 24   Q.   Was there a patent before this?

01:16:17 25   A.   There was a patent before that.

01:16:20	1	Q. And what patent was that?
01:16:21	2	A. It's '756.
01:16:23	3	Q. Okay. This case is not about the '756, is it? This --
01:16:30	4	this case right --
01:16:31	5	A. Yeah, this case is about the '049.
01:16:33	6	Q. Okay. Were you an inventor on both patents?
01:16:36	7	A. Yes -- no, no, I'm not the owner -- I'm the inventor on
01:16:40	8	both patents, yeah.
01:16:41	9	Q. Okay. All right.
01:16:42	10	A. Yeah.
01:16:42	11	Q. Now, do you know what date this reissued patent was
01:16:46	12	issued?
01:16:46	13	A. This patent issued in 2018, September 18.
01:16:51	14	Q. I think, though, the jury has heard something about a
01:16:56	15	priority date. Do you know about that?
01:16:57	16	A. Yes.
01:16:58	17	Q. Tell them your understanding of what a priority date
01:17:01	18	is.
01:17:01	19	A. Priority date is a time we submit our provisional to --
01:17:08	20	yeah, that's much earlier than the patent was issued.
01:17:11	21	Q. Is that the one that shows down here provisional
01:17:14	22	application?
01:17:15	23	A. Yes.
01:17:15	24	Q. September the 24th, 2010?
01:17:17	25	A. Yes.

01:17:18   1   Q.   Okay.   And so even though this patent was issued in

01:17:21   2   2018, its effective date is September of 2010 for all prior

01:17:27   3   art purposes?

01:17:28   4   A.   Yes.

01:17:29   5   Q.   Okay.   Now, after you put a demonstration together,

01:17:46   6   were you ever invited to show your demonstrating materials

01:17:49   7   to anybody?

01:17:50   8   A.   Yes.

01:17:51   9   Q.   And who would that be, please?

01:17:53   10   A.   I went once to California with Dr. Peter Li to show our

01:17:59   11   demo to Apple.

01:18:00   12   Q.   Okay.   And did you demonstrate it to them?

01:18:03   13   A.   Yes.

01:18:03   14   Q.   Okay.   Did you give them any written materials?

01:18:07   15   A.   Pardon me?

01:18:08   16   Q.   Did you give Apple any written materials?

01:18:13   17   A.   I think Dr. Peter Li gave them.   That's not --

01:18:17   18   Q.   Not you?

01:18:18   19   A.   Not -- not me, yeah.

01:18:20   20   Q.   Do you know if an NDA was signed?

01:18:23   21   A.   That's what -- I aware, yeah.

01:18:25   22   Q.   Okay.   Apparently, there was another demonstration at

01:18:29   23   Amazon.   Did you go to that demonstration?

01:18:30   24   A.   I didn't go that one.

01:18:32   25   Q.   Okay.   Do you know who -- who did?

01:18:34   1   A.   Dr. Peter Li went there.

01:18:38   2   Q.   Was your understanding an NDA was signed then, too?

01:18:41   3   A.   Yes.

01:18:41   4   Q.   Okay. And did he give them materials and explain how

01:18:45   5   your product and prototype worked?

01:18:48   6   A.   I think Dr. Peter Li can answer that question better

01:18:51   7   than me.

01:18:52   8   Q.   Okay. But you were not there?

01:18:53   9   A.   Yeah, I were not there.

01:18:55   10   Q.   Okay. Now, this lawsuit is about something that Amazon

01:18:58   11   makes called the Echo. Are you familiar with the Echo?

01:19:02   12   A.   Yes.

01:19:02   13   Q.   And when did you first hear about the Echo?

01:19:06   14   A.   I first hear about the product, Echo, over when I got

01:19:14   15   the invitation from Amazon to join their launch meeting

01:19:14   16   about this product.

01:19:19   17   Q.   You got an invitation?

01:19:20   18   A.   I got invitation.

01:19:23   19   Q.   And it's called a launch party?

01:19:25   20   A.   I remember like that.

01:19:27   21   Q.   Okay. Where was the launch party held?

01:19:30   22   A.   It was held in Manhattan, New York City.

01:19:34   23   Q.   Okay. Do you remember what kind of hall or auditorium

01:19:38   24   it was in?

01:19:38   25   A.   It -- it's -- it was held in a place like a bar.

01:19:41   1   Q.   A bar?

01:19:44   2   A.   Yeah.

01:19:44   3   Q.   So Amazon held the launch party in a bar?

01:19:48   4   A.   Yes.

01:19:48   5   Q.   Okay.   Was it -- about how many people were there?

01:19:51   6   A.   It was crowded, and I think about, like 200, 300

01:19:56   7   persons.   Yeah, that's a guess.

01:19:57   8   Q.   Did Dr. Li go with you?

01:19:59   9   A.   Yeah, Dr. Li, we went separately, yeah, because that's

01:20:02   10   after work.

01:20:03   11   Q.   Okay.   But you met up at the bar?

01:20:08   12   A.   Yes.

01:20:09   13   Q.   To see whatever it was that Amazon invited you to see?

01:20:12   14   A.   Yes.

01:20:12   15   Q.   But they sent you a specific invitation to come?

01:20:16   16   A.   Yes, they sent me email.

01:20:18   17   Q.   Okay.   And Dr. Li the same way?

01:20:20   18   A.   Yes.

01:20:20   19   Q.   Okay.   What -- what did you find at the -- at the

01:20:22   20   launch?   What were they launching?

01:20:24   21   A.   The engineer person from Amazon demonstrated the Echo

01:20:29   22   product to everyone.

01:20:30   23   Q.   Had you ever seen the Echo before?

01:20:32   24   A.   No, this was my first time.

01:20:34   25   Q.   What did the Echo do?

01:20:36   1   A.   The -- the engineer showed -- he talked to the Echo at

01:20:43   2   distance, and the Echo responds with a blue light, indicate

01:20:46   3   that direction.

01:20:52   4   Q.   Okay.   Did lights come on and circle around?

01:20:55   5   A.   Yeah.

01:20:55   6   Q.   Then did the light focus on the speaker?

01:20:58   7   A.   Yes.

01:20:59   8   Q.   What did you think about the Echo product, Doctor?

01:21:01   9   A.   I -- I watched it.   I felt that's very similar to the

01:21:05   10 one we invented.

01:21:07   11 Q.   Did you ask any questions of the Amazon engineers?

01:21:13   12 A.   Yeah, they did have a question section, and so I asked

01:21:17   13 them whether they had sound source recognition in this

01:21:21   14 unit, and they said yes.

01:21:22   15 Q.   So you asked them if they had a sound source locator?

01:21:26   16 A.   I asked them if they had sound source recognition in

01:21:29   17 this unit, yeah.

01:21:31   18 Q.   Okay.   And they said yes?

01:21:33   19 A.   Yeah, they said yes.

01:21:34   20 Q.   Okay.   Did you and Dr. Li talk about the Echo product

01:21:38   21 either there in the bar or later on at the office?

01:21:40   22 A.   Yes, we talked about that.

01:21:42   23 Q.   What was sort of the mood at the company between you

01:21:47   24 and Dr. Li after you saw the Echo product?

01:21:51   25 A.   We felt kind of sad because we put lots of effort for

01:22:05   1   these technologies, and we -- like we know it's the right

01:22:10   2   direction and there's market there, but we haven't

01:22:13   3   successfully commercialized it. And Amazon already came

01:22:16   4   out a product very similar to our invention.

01:22:19   5   Q. Did you eventually come out with a product from --

01:22:22   6   A. After I left Li Creative Technologies, I think Peter

01:22:26   7   continued working on that. They have a product.

01:22:29   8   Q. Okay.

01:22:29   9   A. Yeah.

01:22:30   10   Q. When did you leave?

01:22:31   11   A. I -- I leaved in May 2019.

01:22:33   12   Q. And where do you work now, Doctor, if you do?

01:22:37   13   A. I currently working at a company called the Prospecta.

01:22:42   14   Q. Okay. Can you give me a general idea of what you're

01:22:44   15   working on there?

01:22:46   16   A. In Prospecta?

01:22:46   17   Q. Yes, ma'am.

01:22:50   18   A. In Prospecta, I'm an engineer working on motion

01:22:53   19   learning.

01:22:53   20   Q. Okay. And tell the jury what that is, please.

01:22:56   21   A. Motion learning is a study of computer algorithms that

01:23:06   22   learn from the data, from thousands, big bunch of data, try

01:23:10   23   to looking for the patterns and the statistics in the data.

01:23:13   24   So when the new data comes in, the program can make the

01:23:16   25   decision themselves.

01:23:18   1   Example is like a face detection. We can fit in

01:23:23   2   the motion learning algorithm, thousands of images of

01:23:27   3   people's face, and we can give the program a new image, the

01:23:31   4   image the program never saw, but it can detect whoever the

01:23:35   5   face is. So this technology is called motion learning.

01:23:39   6   It's a subset of artificial intelligence.

01:23:42   7   Q.   Artificial intelligence?

01:23:44   8   A.   Yes.

01:23:44   9   Q.   Is artificial intelligence where actually you try to

01:23:47   10 get the machine to think?

01:23:49   11 A.   Yeah, try to let the machine learn from experience and

01:23:52   12 then work on the new data.

01:23:54   13 Q.   And that's what you're working on now?

01:23:56   14 A.   Yes.

01:23:56   15 Q.   Okay. Doctor, there's been some talk in this case

01:24:05   16 about an article that was published in 2009.

01:24:10   17   MR. BAXTER: That may be PX-273.

01:24:18   18 Q.   (By Mr. Baxter) Are you familiar with this article?

01:24:19   19 A.   Yes.

01:24:20   20 Q.   And is your name on the -- on the article at the top?

01:24:23   21 A.   Yes.

01:24:25   22 Q.   Now, I noticed that there are three -- three authors,

01:24:28   23 Dr. Li and -- and a Mr. Li, not Qi, I take it -- Wei Li?

01:24:39   24 A.   Yes.

01:24:39   25 Q.   Did he help you write the article?

01:24:41   1   A.   Wei Li -- when I joined the company, Wei Li already

01:24:44   2   there, we have about half-year overlap, yeah, and Wei Li

01:24:49   3   worked on this product.

01:24:50   4   Q.   Okay.   Who is the main author of this paper?

01:24:52   5   A.   I remember I drafted this paper.

01:24:54   6   Q.   Okay.

01:24:55   7   A.   Yeah.

01:24:55   8   Q.   And you were kind enough to put both Mr. Peter Li and

01:24:59   9   Mr. Wei Li --

01:25:00   10   A.   Yes.

01:25:00   11   Q.   -- on the paper?

01:25:03   12   A.   Yes.

01:25:03   13   Q.   But you're the primary author?

01:25:06   14   A.   I think Peter is the first author of this paper.

01:25:09   15   Q.   I know it's listed, but I want to know who really wrote

01:25:11   16   it.

01:25:11   17   A.   I think in terms of writing, I think I drafted it.

01:25:14   18   Q.   Okay.

01:25:14   19   A.   Yeah.

01:25:15   20   Q.   Now, I know you weren't here yesterday, but one of

01:25:18   21   these lawyers over here, that one, talked about your

01:25:21   22   paper --

01:25:21   23   A.   Okay.

01:25:22   24   Q.   -- and was very proud of it.   But he said that this

01:25:26   25   paper told you how to do the '049 patent.   So I need you to

01:25:33 1 tell the jury whether or not this paper had anything to do

01:25:39 2 with the '049 patent.

01:25:39 3 A.   Okay.   This paper, the technology mentioned in this

01:25:43 4 paper, it's different from the one we patent in '049.

01:25:48 5 Q.   Tell the jury the differences, please, ma'am.

01:25:53 6 A.   Okay.   So this paper talk about the technology related

01:25:56 7 to another product in Li Creative Technologies.   It's a

01:25:59 8 linear microphone array.   Means there are four microphone

01:26:03 9 sensors in a linear shape.

01:26:06 10   And the application of this product is you hook on

01:26:09 11 the monitor.   And you have to talk in front of it.   So it's

01:26:15 12 a fixed position.   It can only enhance the sound coming

01:26:18 13 from in front of it, yeah.

01:26:20 14 Q.   If you were to hook that to that monitor and stand over

01:26:23 15 here where I am and talk to it --

01:26:26 16 A.   Your voice is going to be very weak.

01:26:28 17 Q.   Okay.   It's not going to work?

01:26:29 18 A.   Yeah.

01:26:30 19 Q.   Okay.   Did it have anything, I mean anything, to do

01:26:37 20 with the development of the '049 patent, this paper?

01:26:39 21 A.   No, no.

01:26:47 22 Q.   So if lawyers for Amazon tell the jury that this paper

01:26:49 23 in 2009 was prior art, that is, it forecast the '049 patent

01:26:55 24 and told you how to write the '049 patent or build a

01:26:59 25 product, would that be correct?

01:27:02	1	A. I think that different technologies, yeah.
01:27:04	2	Q. Okay. Not the same at all?
01:27:06	3	A. Not same at all. There's a noise reduction unit in
01:27:10	4	this one, and also there's a noise reduction unit in the
01:27:14	5	patent. So that's the unit probably in common, yeah.
01:27:18	6	Q. But that's it?
01:27:19	7	A. Yeah, that's it.
01:27:20	8	Q. Okay. Thank you, Dr. Zhu.
01:27:23	9	MR. BAXTER: I pass the witness, Your Honor.
01:27:25	10	THE COURT: Cross-examination by the Defendants.
01:27:37	11	MR. LAQUER: Permission to approach, Your Honor?
01:27:39	12	THE COURT: You may approach with binders.
01:28:22	13	All right. Mr. Hadden, you may proceed with
01:28:24	14	cross-examination.
01:28:25	15	MR. HADDEN: Thank you, Your Honor.
01:28:25	16	CROSS-EXAMINATION
01:28:26	17	BY MR. HADDEN:
01:28:26	18	Q. Good afternoon, Dr. Zhu.
01:28:28	19	A. Good afternoon.
01:28:28	20	Q. Can you hear me okay?
01:28:30	21	A. Yeah, I can hear you clearly.
01:28:32	22	Q. Thank you.
01:28:32	23	MR. HADDEN: Can we get DX-14, please, Mr. Berk?
01:28:33	24	Q. (By Mr. Hadden) I'm going to ask you some questions,
01:28:44	25	Dr. Zhu, about the paper that you were just discussing with

01:28:47   1   your counsel; is that all right?

01:28:48   2   A.   Yes.

01:28:48   3   Q.   Thank you.

01:28:49   4   MR. HADDEN: Could we go to the second page of

01:28:55   5   this paper, Mr. Berk, where we have the heading Beam --

01:29:00   6   Broadband Beamforming?

01:29:06   7   Q.   (By Mr. Hadden)   Now, I heard you testify to your

01:29:08   8   counsel that you -- you drafted this paper; is that right,

01:29:11   9   Dr. Zhu?

01:29:12 10   A.   Yes.

01:29:12 11   Q.   Okay.   And if you look on the second page, there's a

01:29:16 12   heading Broadband Beamforming.   Do you see that?

01:29:18 13   A.   Yes.

01:29:18 14   Q.   Okay.   And underneath that in that column there's a

01:29:22 15   diagram, Figure 3.   Do you see that?

01:29:23 16   A.   Yes.

01:29:25 17   MR. HADDEN: Could we blow that up, Mr. Berk,

01:29:28 18   Figure 3?

01:29:31 19   Q.   (By Mr. Hadden)   So Figure 3 shows a linear microphone

01:29:35 20   array; is that right, Dr. Zhu?

01:29:36 21   A.   Yes.

01:29:39 22   Q.   Okay.   And just to help the jury, that -- that dotted

01:29:42 23   line that is running horizontally toward the top, is that

01:29:46 24   the line that specifies the microphone array?

01:29:52 25   A.   Yes.

01:29:52 1 Q. And what Mr. Berk has helpfully colored green, those

01:30:00 2 dots represent the different microphones in that array?

01:30:03 3 A. Yes.

01:30:03 4 Q. Okay. And it's linear because they're all lined up in

01:30:08 5 a line; is that right, Dr. Zhu?

01:30:09 6 A. Yes.

01:30:11 7 Q. Okay. And there are some arrows that are coming in at

01:30:15 8 an angle of that line. Do you see that?

01:30:17 9 A. The vertical one?

01:30:21 10 Q. The ones that are coming in not at a vertical angle but

01:30:24 11 at a -- the dotted line --

01:30:25 12 A. Oh, the dotted line, yes.

01:30:28 13 Q. And does that line represent the angle to the target

01:30:33 14 source or the speaker that the microphone array is trying

01:30:35 15 to pick up?

01:30:36 16 A. Yeah, this dotted line is present in the sound source

01:30:41 17 direction.

01:30:42 18 Q. Right. And the sound source direction, as shown here

01:30:44 19 in your Figure 3 in the paper, it doesn't have to be 90

01:30:48 20 degrees in front of that array, does it?

01:30:50 21 A. Yes.

01:30:52 22 Q. Yes, it doesn't have to be -- I'm sorry, my question

01:30:55 23 was not well formed.

01:30:57 24   Is it a requirement, as shown in this diagram, if

01:31:00 25 that array is clipped onto your computer, you have to be

01:31:04 1 straight in front of the computer, or can you be at an

01:31:07 2 angle?

01:31:08 3 A. Oh, okay. Let me clarify it. The sound coming from

01:31:13 4 any directions. When the sound coming into our system with

01:31:18 5 suppressed sound coming from the direction on the side, we

01:31:23 6 enhance the sound coming from in the front, yeah.

01:31:25 7 Q. Okay. But the example that you're showing here in

01:31:28 8 Figure 3, the sound is coming in at an angle to the array,

01:31:32 9 correct?

01:31:32 10 A. Yeah. In this figure, right.

01:31:34 11 Q. Okay. And the rest of this diagram, does this show

01:31:40 12 what you have called and I think others have called

01:31:43 13 filter-and-sum beamforming?

01:31:49 14 A. This -- yeah, this figure, we try to implement the

01:31:55 15 filter-and-sum beamforming.

01:31:57 16 Q. Okay. And just to make that a little clearer to the

01:32:00 17 jury -- so we have these lines like X_1 and X_2 coming down

01:32:04 18 from those green dots. Do you see those?

01:32:09 19 A. X_1 and X_2, yes.

01:32:12 20 Q. And those are indicating the output of those

01:32:14 21 microphones, d_1 and d_2; is that correct, Dr. Zhu?

01:32:20 22 A. Yes.

01:32:20 23 Q. Okay. And then we have these W_1 and W_2 in little

01:32:25 24 circles. Do you see those?

01:32:28 25 A. Yes.

01:32:28   1   Q.   And are those the weights that are applied to the

01:32:32   2   outputs of those microphones in order to form a beam?

01:32:33   3   A.   Yeah, that's a filter, yeah.

01:32:35   4   Q.   Filter.   So that's the filter part of the

01:32:40   5   filter-and-sum algorithm; is that correct, Dr. Zhu?

01:32:42   6   A.   Yes.

01:32:43   7   Q.   Okay.   And the sum part is the circle at the bottom

01:32:48   8   with the Greek letter sigma, right?   That indicates

01:32:51   9   summation.   So you're adding up all of those results and

01:32:55 10   multiplying the microphone outputs by those weights; is

01:32:59 11   that correct, Dr. Zhu?

01:33:00 12   A.   Yes.

01:33:00 13   Q.   Okay.   And just -- you didn't invent filter-and-sum

01:33:09 14   beamforming, did you, Dr. Zhu?

01:33:09 15   A.   I didn't.

01:33:11 16   Q.   Okay.   And, in fact, if we look at your patent --

01:33:15 17   MR. HADDEN: Could we go to the '049 patent now,

01:33:17 18   Mr. Berk?   Yeah, putting them side-by-side would be great.

01:33:26 19   Can we go to Figure 4?   Okay.   And blow that out.   Thank

01:33:41 20   you, Mr. Berk.

01:33:42 21   Q.   (By Mr. Hadden)   Now, if we look at Figure 4 -- and

01:33:44 22   this is from your '049 patent you were just talking to

01:33:48 23   Mr. Baxter about, correct?

01:33:49 24   A.   Yes, this is our patent.

01:33:50 25   Q.   Sure.

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01:33:51   1  A.   Yeah.

01:33:52   2  Q.   And Figure 4 also shows a linear microphone array;

01:33:58   3  isn't that right, Dr. Zhu?

01:33:59   4  A.   Yes, this Figure 4 shows linear array.

01:34:03   5  Q.   Okay.   And this Figure 4 is showing essentially the

01:34:08   6  same thing as Figure 3 in your paper, but it looks like

01:34:12   7  there are more microphones in the array in Figure 4; is

01:34:17   8  that correct, Dr. Zhu?

01:34:18   9  A.   Yes.

01:34:19  10  Q.   Okay.   So, again, we have the -- the arrow that shows

01:34:25  11  this angle of the target sound signal, relative to the

01:34:32  12  microphone array in Figure 4.   Do you see that at the top?

01:34:35  13  A.   Yes.

01:34:36  14  Q.   Okay.   And in both Figure 3 from your paper and

01:34:42  15  Figure 4 in the patent, the purpose of this filter-and-sum

01:34:53  16  beamforming is to form a beam in the microphone array that

01:34:58  17  points in the direction of that target sound source, right,

01:35:02  18  Dr. Zhu?

01:35:03  19  A.   Yes.

01:35:08  20  Q.   Okay.   And that target sound source, the direction of

01:35:12  21  it is specified by this angle between the array and

01:35:20  22  wherever the sound source is, whatever it is you're trying

01:35:23  23  to listen to, right, Dr. Zhu?

01:35:26  24  A.   Yeah, that's illustrated in this figure.

01:35:29  25  Q.   Okay.   And to find that angle, you have to first locate
```

01:35:37 1 the sound source before you can perform this filter-and-sum

01:35:42 2 beamforming; isn't that correct, Dr. Zhu?

01:35:45 3 A. Yes.

01:35:48 4 Q. Because those weights, those little Ws in the diagram,

01:35:52 5 they depend on the angle of that sound source you're trying

01:36:00 6 to listen to?

01:36:00 7 A. Yeah, that's in the simulation. We have predefined

01:36:03 8 those angles and to generate these filters.

01:36:08 9   MR. HADDEN: And if we go back to the paper,

01:36:10 10 Mr. Berk. If we look at that same column we were looking

01:36:19 11 at underneath the Figure 3. Can we blow up that text,

01:36:23 12 Mr. Berk?

01:36:34 13 Q. (By Mr. Hadden) Sure. So this talks about the spatial

01:36:39 14 directivity pattern, and it's a function H of a couple of

01:36:42 15 Greek letters, one of which is the angle theta -- the sound

01:36:47 16 source angle theta, and the other is a frequency. Do you

01:36:51 17 see that?

01:36:51 18 A. Yes.

01:36:52 19 Q. And this directivity pattern, that is what specifies

01:36:55 20 kind of the shape of the beam that you're trying to form;

01:36:58 21 isn't that right, Dr. Zhu?

01:36:59 22 A. Yes.

01:37:03 23 Q. Okay.

01:37:04 24   MR. HADDEN: And if we go to the top of the next

01:37:08 25 column, Mr. Berk, in this same article. Can you blow that

01:37:13   1   up? Just -- yeah, just the formula at the top, if you

01:37:18   2   could.

01:37:18   3   Q. (By Mr. Hadden) Now, this is a -- a formula from your

01:37:27   4   paper. And it specifies how that shape of that beam

01:37:30   5   depends on the frequency and that angle that -- to the

01:37:37   6   target sound source and these weights; isn't that right,

01:37:39   7   Dr. Zhu?

01:37:39   8   A. Yeah, that's why we implemented the microphone array.

01:37:45   9   That's what we did in the paper.

01:37:47   10   Q. Okay. And if we look at your patent --

01:37:49   11   MR. HADDEN: At Column 7, Mr. Berk.

01:38:10   12   Q. (By Mr. Hadden) I apologize. The text here is not as

01:38:12   13   clear.

01:38:13   14   MR. HADDEN: If you can move down.

01:38:15   15   Q. (By Mr. Hadden) The equation you have in the patent

01:38:17   16   for forming that beam shape that is pointed at the target

01:38:23   17   sound source you're trying to listen to, it's the same

01:38:26   18   formula that's in your paper, isn't it, Dr. Zhu?

01:38:29   19   A. Yes. Like I said, that's one way to implement

01:38:33   20   beamforming.

01:38:48   21   MR. HADDEN: Now, if we go back to Figure 3 of the

01:38:50   22   patent, please -- the article, please, Mr. Berk.

01:38:54   23   Q. (By Mr. Hadden) Now, if you look at the top of this

01:39:03   24   figure again, Figure -- Figure 3 from your article from

01:39:07   25   2009, there's a little Greek letter tau with a subscript 3.

01:39:17   1   Do you see that, Dr. Zhu?

01:39:18   2   A.   Yes.

01:39:19   3   Q.   And that represents the delay to microphone that's

01:39:22   4   indicated as d_3 from the center of that microphone array;

01:39:26   5   isn't that right, Dr. Zhu?

01:39:27   6   A.   Yeah.   In this paper, yes.

01:39:28   7   Q.   Okay.   And, again, that delay depends on that angle to

01:39:38   8   the target sound source that has been located; isn't that

01:39:39   9   right?

01:39:40   10   A.   Yes.

01:39:41   11   Q.   Okay.   And that delay is used to calculate those

01:39:49   12   weights, W_1, W_2, W_3, W_4 that are used to form that beam that

01:39:57   13   is directed at that target sound source; isn't that right,

01:40:01   14   Dr. Zhu?

01:40:03   15   A.   Let me -- I think they're related, yes.

01:40:17   16   Q.   Okay.

01:40:17   17   MR. HADDEN: And if we look at -- if we could,

01:40:22   18   Mr. Berk, to the second column on that same page of the

01:40:23   19   paper.   There's a sentence that begins, we use tau_n and it

01:40:28   20   has a formula.

01:40:30   21   A.   Yes.

01:40:30   22   Q.   (By Mr. Hadden)   So this is the formula for that delay.

01:40:37   23   This has a subscript n, which just means it can be any one

01:40:42   24   of those microphones, right, so --

01:40:43   25   A.   Can you repeat your question?

01:40:45	1	Q. Sure. I'm sorry. I'll start over.
01:40:47	2	Do you see this formula from your 2009 paper,
01:40:50	3	Dr. Zhu?
01:40:50	4	A. Uh-huh, yes.
01:40:51	5	Q. And -- and it has tau, which is the little Greek letter
01:40:55	6	that looks like a t, and it has a subscript n. Do you see
01:40:59	7	that?
01:40:59	8	A. Yes.
01:41:00	9	Q. And n is just a -- kind of placeholder for the number
01:41:03	10	of the microphone that we're talking about, right?
01:41:08	11	A. Yes.
01:41:08	12	Q. Okay. And then -- has a formula for that delay, and it
01:41:14	13	is a frequency -- a sampling frequency multiplied by d_n
01:41:23	14	which is the distance in the microphone from the center of
01:41:25	15	the array. And then it's multiplied by the cosine of the
01:41:29	16	angle theta, which is the angle to the target sound source.
01:41:36	17	And all that's divided by c, which is the speed of sound.
01:41:41	18	Is that correct, Dr. Zhu?
01:41:42	19	A. Yes.
01:41:43	20	Q. Okay. And if we look at Figure 6 in your patent.
01:42:01	21	MR. HADDEN: If we could blow up 6A -- actually
01:42:07	22	6B, Mr. Berk.
01:42:08	23	Q. (By Mr. Hadden) And I'm sorry for that. The text is
01:42:10	24	not as clear as I would hope on the patent version we have
01:42:15	25	here. But if you can see, this is Table 6B from your

01:42:19 1 patent. And it has in the column on the right delay tau,

01:42:27 2 and it says in parentheses number of samples. Do you see

01:42:31 3 that.

01:42:32 4 A. Yes.

01:42:33 5 Q. Okay. And if we look at the entry for 180 degrees, the

01:42:44 6 equation for the delay tau is the same as the equation from

01:42:47 7 your paper describing Figure 3; isn't that right, Dr. Zhu?

01:42:50 8 A. Yeah, that's a specific situation.

01:42:56 9 Q. Right. So for a linear array, the angle between the

01:43:01 10 microphone and the center of the array is going to be

01:43:08 11 either 0 degrees or 180 degrees, depending on what side of

01:43:12 12 the midpoint it's on, right, Dr. Zhu?

01:43:14 13 A. Can you repeat that question?

01:43:17 14 Q. Sure.

01:43:17 15 A. Sorry.

01:43:19 16 Q. So you said it's a special case, and I'm just trying to

01:43:23 17 understand. It's a special case because when we have a

01:43:26 18 linear microphone array, the only angle between a

01:43:32 19 microphone in the center of the array, because they're in a

01:43:35 20 line, it's either 0 degrees or 180 degrees, right?

01:43:40 21 A. Can you put this figure back to the context because the

01:43:46 22 180 means the sound source sensor position.

01:43:54 23 Q. Right. Isn't the sound source sensor the microphone?

01:43:56 24 A. Yeah, the sound source sensor is the microphone, yeah.

01:43:59 25 Q. So this is the angle of the microphone relative to the

01:44:02 1 center of the microphone array, right, Dr. Zhu?

01:44:09 2 A. I think this one, the sensor, I put in the linear

01:44:12 3 shape.

01:44:13 4 Q. Right. And that's the same shape that you show in

01:44:16 5 Figure 3 of your 2009 paper, right, Dr. Zhu?

01:44:20 6 A. Yes.

01:44:20 7 Q. Right. So -- and to be clear, you describe linear

01:44:30 8 microphone arrays, as well as circular microphone arrays,

01:44:33 9 in the '049 patent, right, Dr. Zhu?

01:44:34 10 A. Yes, they are two special cases for my invention.

01:44:38 11 Q. Right. And so for the case of the linear microphone

01:44:41 12 array, you show the same formula for calculating the delay

01:44:58 13 in your 2009 article as you do in this Figure 6B from your

01:45:03 14 '049 patent, don't you, Dr. Zhu?

01:45:04 15 A. Yes.

01:45:05 16 Q. Thank you.

01:45:24 17   MR. HADDEN: Now, if we go to -- could we go to

01:45:27 18 the introduction of the paper, the 2009 paper? Could you

01:45:37 19 blow up the first paragraph? Now -- oh, I'm sorry, the

01:45:48 20 second paragraph, Mr. Berk. My bad.

01:45:51 21 Q. (By Mr. Hadden) Now, this paper that you and Dr. Li

01:45:54 22 published in 2009, that was presented at a conference in

01:45:58 23 Taiwan; is that correct, Dr. Zhu?

01:46:00 24 A. Yes.

01:46:04 25 Q. And the purpose of the paper was to publicize the work

01:46:07 1 that you had -- you and Dr. Li had done; isn't that right,

01:46:13 2 Dr. Zhu?

01:46:13 3 A. Yeah, presented the technology we had, yeah.

01:46:17 4 Q. And you weren't trying to keep what is described in

01:46:20 5 this paper secret, were you?

01:46:22 6 A. Yeah, this is public paper.

01:46:24 7 Q. Right. And the purpose was to put it out there so that

01:46:27 8 everybody could read it; isn't that correct?

01:46:28 9 A. Yes.

01:46:30 10 Q. Thank you.

01:46:36 11   MR. HADDEN: Now, if we blow up the first sentence

01:46:38 12 of this, Mr. Berk.

01:46:40 13 Q. (By Mr. Hadden) You say in this paper you drafted, one

01:46:47 14 of the major challenges in applying a microphone array in

01:46:51 15 speech recognition is that speech is a wideband signal.

01:46:55 16 Narrow -- the traditional narrowband beamforming techniques

01:46:58 17 are not appropriate anymore.

01:47:00 18   Do you see that?

01:47:01 19 A. Yes.

01:47:01 20 Q. And you cite -- you have a cite there, No. 4, that's to

01:47:05 21 one of the references that you cite in the back of the

01:47:09 22 paper. Isn't that right, Dr. Zhu?

01:47:10 23 A. Yes.

01:47:16 24 Q. Right.

01:47:16 25   MR. HADDEN: And if we look at the references in

01:47:21   1 the back, please, Mr. Berk. If you'll just blow those up.

01:47:23   2 Q. (By Mr. Hadden) Figure -- No. 4 that you cite there is

01:47:30   3 this book by Professor Brandstein, that we've heard a bit

01:47:36   4 about. Do you see that, Dr. Zhu?

01:47:38   5 A. Yes.

01:47:38   6 Q. And you were familiar with Dr. Brandstein's book when

01:47:43   7 you were writing this paper in 2009, weren't you?

01:47:45   8 A. That's one of our reference.

01:47:48   9 Q. And as I understood your testimony, your Master's

01:47:53   10 degree and your Ph.D. were in -- related more to pattern

01:47:58   11 recognition rather than acoustic signal processing; is that

01:48:04   12 accurate?

01:48:04   13 A. Yeah, but they're all related to signal processing,

01:48:08   14 more general --

01:48:09   15 Q. But to learn the specifics of microphone arrays and

01:48:14   16 acoustical signal processing, you read technical books and

01:48:19   17 articles while you were working with -- with Dr. Li at Li

01:48:23   18 Creative, didn't you?

01:48:25   19 A. Yes.

01:48:26   20 Q. Okay. And some of those technical books and articles,

01:48:31   21 you listed here as references in your 2009 paper; is that

01:48:36   22 correct, Dr. Zhu?

01:48:38   23 A. Yes.

01:48:45   24 Q. Okay. Now -- and when you were getting up to speed and

01:48:56   25 learning about acoustic signal processing, you looked at

01:49:01   1   adaptive beamforming algorithms that were invented by other

01:49:06   2   people while you were working on your VoiceFocus prototype

01:49:11   3   in 2008; isn't that correct, Dr. Zhu?

01:49:14   4   A.   I read lots of paper when I develop -- everything,

01:49:20   5   yeah.

01:49:20   6   Q.   And, specifically, did you look at any adaptive

01:49:24   7   beamforming algorithms invented by others when you were

01:49:26   8   working on the VoiceFocus phone in 2008?

01:49:30   9   A.   Yeah, I read papers about that.

01:49:33   10   Q.   And you also looked at sound source localization

01:49:40   11   algorithms developed by others when you were working at Li

01:49:44   12   Creative in 2008 on that VoiceFocus phone; isn't that

01:49:48   13   correct, Dr. Zhu?

01:49:50   14   A.   Yes.

01:49:51   15   Q.   And your patent, the '049 patent, talks about a

01:50:00   16   particular sound source localization algorithm called

01:50:05   17   SRP-PHAT where PHAT is P-H-A-T. Do you recall that,

01:50:11   18   Dr. Zhu?

01:50:12   19   A.   Yeah, I recall that term.

01:50:17   20   MR. HADDEN: And if we look at the patent, if we

01:50:19   21   could, Mr. Berk, at Column 11, Lines 25 to 28.

01:50:29   22   Q.   (By Mr. Hadden) Now, this is from the '049 patent.

01:50:33   23   And you're talking about methods for estimating a spatial

01:50:37   24   location of the target sound signal. Do you see that,

01:50:40   25   Dr. Zhu?

01:50:42   1   A.   Yes.

01:50:43   2   Q.   And it mentions using a steered response power-phase

01:50:55   3   transform, SRP-PHAT.   Do you see that?

01:50:57   4   A.   I saw that.

01:50:58   5   Q.   And, again, you didn't invent that sound source

01:51:05   6   localization algorithm, SRP-PHAT, did you, Dr. Zhu?

01:51:08   7   A.   Yeah, I did not invent that.   This one of the method

01:51:13   8   over there.

01:51:13   9   Q.   So there were other methods, well-known methods for --

01:51:16   10   A.   Yeah, there are other methods.

01:51:18   11   Q.   Thank you, Dr. Zhu.

01:51:19   12   Now, you also, while you were learning about

01:51:25   13   acoustical signal processing, you looked at noise reduction

01:51:31   14   algorithms that were developed by others while you were

01:51:34   15   working on the VoiceFocus conference phone in 2008, didn't

01:51:39   16   you, Dr. Zhu?

01:51:45   17   A.   Yes.

01:51:48   18   MR. HADDEN: And if we go back -- if we could just

01:51:50   19   blow up, again, those references from the 2009 paper.

01:52:00   20   Q.   (By Mr. Hadden)   Now, if we compare what we see here in

01:52:03   21   the references in the 2009 paper to the references that

01:52:08   22   were cited by the patent examiner on the '049 patent --

01:52:15   23   MR. HADDEN: Could we do that, Mr. Berk?   Could we

01:52:22   24   just blow up -- there we go.

01:52:24   25   Q.   (By Mr. Hadden)   So you -- you understand, Dr. Zhu,

01:52:29   1   that on the front of a patent, it lists the references that

01:52:34   2   were considered by the patent examiner under this heading

01:52:37   3   References Cited? You understand that, Dr. Zhu?

01:52:43   4   A. Can you repeat your question?

01:52:45   5   Q. Sure. On the front of the patent, there is a heading

01:52:51   6   that says References Cited; do you see that?

01:52:54   7   A. Yes.

01:52:54   8   Q. Do you understand that underneath that heading,

01:52:58   9   References Cited, is a list of the prior art, the patents

01:53:01 10   and articles that the patent examiner considered when

01:53:04 11   they're deciding whether or not to allow the patent? Do

01:53:07 12   you understand that?

01:53:07 13   A. Yes.

01:53:12 14   Q. Okay. And if we look here on what the examiner

01:53:14 15   considered, we have some U.S. patent documents on the

01:53:18 16   front. We have some foreign patent documents.

01:53:22 17   MR. HADDEN: And then if you could, Mr. Berk, go

01:53:24 18   to the next page where it's continued so we can see all of

01:53:27 19   them. Could you blow that up?

01:53:41 20   Q. (By Mr. Hadden) And there are some additional U.S.

01:53:43 21   patent documents cited here. Do you see that, Dr. Zhu?

01:53:45 22   A. Yes, I saw that.

01:53:46 23   Q. But none of the articles or the Brandstein book or any

01:53:49 24   of these other technical articles that had other adaptive

01:53:53 25   beamforming algorithms that you looked at, other sound

01:54:01 1 source localization algorithms that you looked at, none of

01:54:03 2 those were cited or considered by the patent examiner when

01:54:06 3 he allowed your '049 patent. Isn't that correct, Dr. Zhu?

01:54:10 4 A. When we filed the patent, we give all our relevance --

01:54:15 5 our relevance materials to the patent attorney. And I

01:54:19 6 think he, as a expert, decide what to include and what to

01:54:26 7 not include. So I'm not expert on that.

01:54:30 8 Q. Okay. But we can both tell just looking at the face of

01:54:34 9 the patent that the technical papers and the Brandstein

01:54:40 10 book that you relied on in writing that 2009 article were

01:54:45 11 not considered by the patent examiner when he allowed the

01:54:51 12 '049 patent. Isn't that correct, Dr. Zhu?

01:54:53 13 A. I'm not a person that can judge that, I'm sorry, yeah.

01:54:56 14 Q. Well, we can both read the patent. You agree with what

01:55:00 15 is -- what you cited in your references in your 2009 paper

01:55:04 16 do not appear as cited references in the '049 patent?

01:55:08 17 A. Yes.

01:55:08 18 Q. Can you agree with that?

01:55:09 19 A. Yeah, I agree with that.

01:55:10 20 Q. Thank you, Dr. Zhu.

01:55:11 21 A. Yeah.

01:55:13 22   THE COURT: Dr. Zhu, please make sure he's

01:55:16 23 finished the question before you answer, all right?

01:55:18 24   THE WITNESS: Okay.

01:55:18 25   THE COURT: That's not as bad as talking over

01:55:21   1   people.   But neither one is to be encouraged.

01:55:25   2   THE WITNESS: Thank you.

01:55:25   3   THE COURT: Let's continue.

01:55:26   4   MR. HADDEN: Thank you, Your Honor.

01:55:27   5   Q.   (By Mr. Hadden)   Now, I would like to talk a little

01:55:29   6   more about the '049 patent and how it works, if we could.

01:55:32   7   Is that all right, Dr. Zhu?

01:55:34   8   A.   Yes.

01:55:35   9   Q.   Thank you.

01:55:35 10   MR. HADDEN: Can we go to Claim 1, please,

01:55:38 11   Mr. Berk?   And can we blow up -- can we blow up the

01:56:02 12   providing paragraph, please, Mr. Berk?

01:56:05 13   Q.   (By Mr. Hadden)   Now, while he's doing that, Dr. Zhu,

01:56:08 14   you understand that Claim 1 is a claim -- it's the

01:56:13 15   independent claim that Vocalife is asserting against Amazon

01:56:18 16   in this case?   Do you understand that, Dr. Zhu?

01:56:24 17   A.   I'm not so familiar with all these legal terms.   I

01:56:33 18   understand that Claim 1 is important, yeah.

01:56:35 19   Q.   Okay.   That's good enough.

01:56:36 20   And Claim 1 is important, you understand, because

01:56:40 21   if Amazon is liable in this case, it is only because the

01:56:47 22   jury finds that the accused Amazon Echos do everything that

01:56:55 23   Claim 1 requires.   You understand that, don't you?

01:56:55 24   A.   Yes.

01:57:11 25   Q.   Okay.   And so --

01:57:11 1   MR. BAXTER: Seems like an expert question,

01:57:14 2 Your Honor, that she's probably not qualified to give, and

01:57:15 3 we'd object to it.

01:57:22 4   THE COURT: Restate the question, Mr. Hadden.

01:57:25 5   MR. HADDEN: Sure.

01:57:25 6 Q. (By Mr. Hadden) You understand, don't you, Dr. Zhu,

01:57:28 7 that the jury is going to have to decide whether or not the

01:57:31 8 accused Amazon Echos do what Claim 1 requires? You

01:57:36 9 understand that, don't you?

01:57:37 10   MR. BAXTER: Same objection, Your Honor.

01:57:39 11   THE COURT: I think we're getting awfully close to

01:57:42 12 asking for opinion testimony, counsel.

01:57:44 13   I'll sustain that.

01:57:45 14   MR. HADDEN: Okay. Thank you, Your Honor.

01:57:46 15 Q. (By Mr. Hadden) Now, if we look at Claim 1, Dr. Zhu,

01:57:52 16 the first element that we've highlighted here talks about a

01:57:55 17 microphone array system. Do you see that?

01:57:59 18 A. Yes.

01:58:00 19 Q. And do you understand, Dr. Zhu, that because this is a

01:58:03 20 reissue patent, as you heard about, some of the language is

01:58:08 21 in square, kind of bold brackets? Do you see that?

01:58:15 22 There's an example here: [An arbitrary]. Do you see that,

01:58:19 23 Dr. Zhu?

01:58:19 24 A. Yes.

01:58:19 25 Q. So that language is essentially taken out. Do you

01:58:22 1 understand that when you're reading these claims?

01:58:23 2 A.   Yes.

01:58:24 3 Q.   And there's some italicized language, and that is

01:58:32 4 language that was added as part of the reissue. Do you

01:58:35 5 understand that, in reading this claim?

01:58:37 6 A.   Okay.

01:58:43 7 Q.   So I just want to look at this first part that talks

01:58:45 8 about providing a microphone array system comprising an

01:58:48 9 array of sound sensors. And then it says: Positioned in a

01:58:54 10 linear, circular, or other configuration.

01:58:57 11   Do you see that?

01:58:58 12 A.   Yes.

01:59:05 13 Q.   So you understand that this claim applies to both

01:59:09 14 circular microphone arrays and also a linear microphone

01:59:13 15 array like you described in your 2009 paper? You

01:59:15 16 understand that, don't you, Dr. Zhu?

01:59:17 17 A.   Yes, I understand our patent is a general design of the

01:59:22 18 microphone array to cover all configurations.

01:59:25 19 Q.   Thank you.

01:59:26 20 A.   Yeah.

01:59:27 21   MR. HADDEN: Can we go to the determining step,

01:59:29 22 Mr. Berk?

01:59:42 23 Q.   (By Mr. Hadden)   Now, there's this long paragraph here

01:59:45 24 in this claim. Just start at the beginning. It talks

01:59:49 25 about determining a delay between each of said sound

01:59:52 1 sensors and an origin of said array of sound sensors.

01:59:56 2   Do you see that, Dr. Zhu?

01:59:57 3 A. Yes.

01:59:58 4 Q. And an example of that delay is that tau, little t,

02:00:08 5 with a 3, that we saw in your 2009 paper and also in

02:00:12 6 Figure 6B of the '049 patent; isn't that right, Dr. Zhu?

02:00:18 7 A. I couldn't recall the specific figure number, but

02:00:23 8 that's the one, yeah --

02:00:26 9 Q. Okay.

02:00:26 10 A. -- in the -- on the paper -- the top, yeah.

02:00:30 11 Q. And then this claim goes on, and it requires that that

02:00:35 12 delay is a function of distance between each of said sound

02:00:41 13 sensors and said origin. You see that, Dr. Zhu?

02:00:47 14 A. Yes.

02:00:47 15 Q. And -- and that was that variable d that specified the

02:00:52 16 distance of the microphone from the center of the array.

02:00:57 17 It was in both your 2009 article and also in the formula in

02:01:02 18 6B of the patent. Do you recall that, Dr. Zhu?

02:01:06 19 A. Yeah, you can refer this to that figure. Yeah.

02:01:10 20 Q. Thank you.

02:01:16 21   Then that delay has to be determined also by a

02:01:20 22 predefined angle between each of said sound sensors and a

02:01:26 23 reference axis. Do you see that?

02:01:29 24 A. Yes.

02:01:31 25 Q. So that is, again, talking about that angle between

02:01:36	1	either the linear axis of the linear array or an axis
02:01:42	2	across one diameter of a circle in a circular array and the
02:01:47	3	position of a particular microphone; isn't that right,
02:01:50	4	Dr. Zhu?
02:01:50	5	A. Can you repeat your question?
02:01:52	6	Q. Sure. So the predefined angle that it's talking about
02:01:56	7	here in Claim 1 is the angle of one of those microphones
02:02:02	8	from either the linear -- the line that defines the linear
02:02:09	9	array or a diameter that is a reference in the circular
02:02:17	10	array, right, Dr. Zhu?
02:02:18	11	A. Yeah, it's -- yeah, depending on where you put the
02:02:26	12	reference point is, yeah.
02:02:27	13	Q. Okay. And then that delay that has to be determined
02:02:31	14	has to depend on yet another variable. And it goes on and
02:02:41	15	says here: An azimuth angle between said reference axis
02:02:45	16	and said target sound signal.
02:02:47	17	Do you see that?
02:02:48	18	A. Yes.
02:02:48	19	Q. And that is that angle that we saw both in Figure 3 in
02:02:52	20	your 2009 paper and also in the formulas in 6B of the '049
02:03:00	21	patent that -- that is the angle to that target sound, what
02:03:07	22	it is you're trying to listen to. Isn't that right,
02:03:09	23	Dr. Zhu?
02:03:09	24	A. Yes. With respect to the reference axis, yeah.
02:03:15	25	Q. Okay. So in Figure -- in Claim 1 of your patent, this

02:03:27   1   determining a delay step, requires calculating a delay is a

02:03:33   2   function of three different things, right? It's got to be

02:03:36   3   the distance of a microphone to the origin, a predefined

02:03:42   4   angle between that microphone and a reference axis, and

02:03:46   5   this azimuth angle between that same reference axis and the

02:03:51   6   sound -- target sound signal. Is that right, Dr. Zhu?

02:03:56   7   A.   This is a specific example to calculate the delay. But

02:04:02   8   the delay defined in Claim 1 is more general.

02:04:04   9   Q.   But this is Claim 1, Dr. Zhu. We're reading from

02:04:11   10 Claim 1.

02:04:11   11 A.   Can you zoom out, please?

02:04:14   12 Q.   Sure.

02:04:15   13   MR. HADDEN: Can you show this?

02:04:43   14 Q.   (By Mr. Hadden) So the language that we were

02:04:44   15 discussing is in the middle of Claim 1 in this determining

02:04:51   16 paragraph.

02:04:51   17   Do you see that, Dr. Zhu?

02:04:52   18 A.   Yes.

02:04:53   19 Q.   Okay. So -- so in Claim 1, all of those requirements

02:05:02   20 of how the delay is determined are specified explicitly;

02:05:08   21 isn't that right, Dr. Zhu?

02:05:09   22 A.   All this related to the delay.

02:05:11   23 Q.   So the delay has to be calculated, according to

02:05:18   24 Claim 1, for each microphone in the array; isn't that

02:05:24   25 correct, Dr. Zhu?

02:05:27 1   A.   Yeah, the delay has to be -- in this statement, the

02:05:34 2   delay need to be decided according to those parameters.

02:05:38 3   Q.   Those three -- the two angles that we talked about and

02:05:44 4   the distance, and that has to be done for each microphone

02:05:48 5   in the array. Isn't that correct, Dr. Zhu?

02:05:49 6   A.   I think that's a specific example.

02:05:51 7   Q.   Well, let's just focus on Claim 1 and what it requires.

02:05:59 8   Doesn't it require what I just said, that it requires

02:06:03 9   determining a delay between each of the sound sensors --

02:06:06 10 those are microphones -- and an origin of that array.

02:06:10 11 Isn't that right, Dr. Zhu?

02:06:13 12 A.   Yeah, that's where you calculate the delay.

02:06:16 13 Q.   And in calculating that delay, the calculation has to

02:06:19 14 be a function of distance between the sound sensor and the

02:06:23 15 origin, a predefined angle between each of said sound

02:06:27 16 sensors and a reference axis, and this azimuth angle

02:06:31 17 between said reference and the target sound signal, right?

02:06:37 18 A.   People can define different functions to use all these

02:06:44 19 parameters.

02:06:45 20 Q.   Right. But the function has to use all of those

02:06:48 21 parameters to calculate the delay, right, Dr. Zhu? Isn't

02:07:00 22 that right, Dr. Zhu?

02:07:01 23 A.   I still think determine delay probably be more general

02:07:05 24 than that.

02:07:06 25 Q.   Well, sure. There may be ways can you determine a

02:07:10 1 delay more general than that, but if they're going to use

02:07:14 2 Claim 1 of your patent, they have to do what Claim 1 of the

02:07:19 3 patent says, don't they, Dr. Zhu?

02:07:22 4   MR. BAXTER: Once again, Your Honor. It's expert

02:07:24 5 opinion.

02:07:24 6   THE COURT: I'll overrule this question --

02:07:27 7 overrule this objection.

02:07:32 8 Q. (By Mr. Hadden) You can go ahead and answer, Dr. Zhu.

02:07:34 9 A. Can you repeat your question?

02:07:34 10   THE COURT: Counsel, if the witness has not

02:07:37 11 answered to your satisfaction, raise it with me.

02:07:40 12   MR. HADDEN: Oh, I apologize, Your Honor.

02:07:41 13   THE COURT: Don't instruct the witness.

02:07:42 14   MR. HADDEN: I apologize, Your Honor.

02:07:43 15   THE COURT: When you're ready, Dr. Zhu, please

02:07:45 16 answer the question.

02:07:46 17   MR. BAXTER: I think she had asked for a repeat of

02:07:48 18 it, Your Honor, so we'll have it firmly in mind.

02:07:52 19   THE COURT: Well, given the colloquy that's taken

02:07:55 20 place, let's start over.

02:07:57 21   Restate your question.

02:07:59 22   MR. HADDEN: Yes, Your Honor.

02:08:00 23 Q. (By Mr. Hadden) My question was, Dr. Zhu, if somebody

02:08:03 24 is going to be using Claim 1 of your patent, they have to

02:08:06 25 calculate the delay as Claim 1 describes; isn't that

02:08:13   1   correct, Dr. Zhu?

02:08:14   2   A.   What I want to say, for the determine of the delay,

02:08:41   3   need to use spatial location, need to have the -- yes,

02:08:47   4   spatial location relationship between the sensors and

02:08:53   5   the -- the sound direction.

02:09:00   6   MR. HADDEN: Object, Your Honor, non-responsive.

02:09:03   7   THE COURT: I'll sustain that.

02:09:03   8   Dr. Zhu, you need to answer the question that's

02:09:06   9   asked.

02:09:06   10   The question is: If somebody is going to be using

02:09:09   11   Claim 1 of your patent, they have to calculate the delay as

02:09:14   12   Claim 1 describes it; isn't that correct?

02:09:17   13   That's the question.   Can you answer that

02:09:19   14   question?

02:09:38   15   THE WITNESS: I want --

02:09:40   16   THE COURT: If you --

02:09:41   17   THE WITNESS: I want to say if all these

02:09:43   18   parameters can be, like, expressed by a function of other

02:09:48   19   parameters.   So it's all related.   So, for example, there's

02:09:55   20   another parameter that related to some of them, but when

02:10:01   21   people determine the delay, use that parameter, I think it

02:10:09   22   still -- as long as it related, I think, yes.

02:10:14   23   THE COURT: So your answer to the question is yes?

02:10:16   24   THE WITNESS: Any -- any combination of those

02:10:21   25   parameters.   So any parameters that can be a combination of

02:10:26 1 function of those parameters is part of the determine of

02:10:32 2 the delay.

02:10:32 3   So I -- I -- so may not be specific to those

02:10:43 4 parameters. The new parameter can be a function of this

02:10:47 5 one. But you -- still belonging to this statement. That's

02:10:53 6 my understanding.

02:10:55 7   MR. HADDEN: Same objection, Your Honor.

02:10:56 8   THE COURT: All right. I'm going to sustain the

02:11:01 9 objection again.

02:11:01 10   The question, Dr. Zhu, is: If someone is using

02:11:07 11 Claim 1 of the '409 [sic] patent, is it or is it not true

02:11:16 12 that they have to calculate the -- the delay as called for

02:11:19 13 in Claim 1?

02:11:22 14   THE WITNESS: Can I explain my concern,

02:11:25 15 for example --

02:11:25 16   THE COURT: You can -- you can either answer that,

02:11:27 17 yes, they can; no, they can't; or I don't know. One of

02:11:30 18 those three answers.

02:11:32 19   THE WITNESS: I cannot explain.

02:11:34 20   THE COURT: All right. Then that's an acceptable

02:11:35 21 answer.

02:11:35 22   Let's proceed.

02:11:37 23   MR. HADDEN: Thank you, Your Honor.

02:11:38 24 Q. (By Mr. Hadden) Now, to calculate a delay using an

02:11:47 25 azimuth angle between said reference axis and said target

02:11:54 1   sound signal, the system has to already know the angle to

02:11:57 2   the target sound signal; isn't that right, Dr. Zhu?

02:12:01 3   A.   Some parameters need to precalculate according to if

02:12:07 4   the sound coming from that direction, yeah.

02:12:13 5   Q.   So to use an azimuth angle between said reference axis

02:12:18 6   and said target sound signal, the system has to know when

02:12:24 7   it's calculating the delay, where the target sound is

02:12:27 8   coming from.   Isn't that correct, Dr. Zhu?

02:12:43 9   A.   For example, if we already -- the parameter is two

02:12:47 10 sides of a triangle.   If you know that, you know the third

02:12:56 11 side of the triangle.

02:12:57 12   So if they do not use -- for example, the known

02:13:01 13 parameters are the two sides of the triangle.   That's my

02:13:04 14 definition, for example.   People can still use the third

02:13:08 15 side as a parameter because they are correlated.   So --

02:13:22 16   MR. HADDEN: Objection, non-responsive,

02:13:24 17 Your Honor.

02:13:24 18   THE COURT: Restate the question.

02:13:25 19   MR. HADDEN: Sure.

02:13:25 20 Q.   (By Mr. Hadden)   To determine a delay using an azimuth

02:13:32 21 angle between said reference axis and said target sound

02:13:36 22 signal, the system has to know the angle to the target

02:13:40 23 sound signal.   Isn't that right, Dr. Zhu?   Yes or no?

02:13:43 24 A.   It has to know the relation -- the spatial relationship

02:13:47 25 between the sound source and this -- the -- the spatial

02:13:53   1   relationship is more general than just azimuth angle and

02:13:59   2   other angle. So...

02:14:03   3   Q. So it's true, isn't it, Dr. Zhu, that to determine a

02:14:11   4   delay using an azimuth angle between said reference axis

02:14:17   5   and said target sound signal, the system has to know the

02:14:21   6   location of the target sound signal? Isn't that correct?

02:15:09   7   A. The system has to know the spatial relationship between

02:15:13   8   the sound sensor and the sound direction.

02:15:23   9   Q. And is spatial relationship different than location?

02:15:26   10 A. It's related to it.

02:15:30   11 Q. All right. So if you -- well, if we look at the claim

02:15:39   12 underneath the determining, there is a step that says,

02:15:42   13 estimating a spatial location of said target sound signal

02:15:48   14 from said received sound signals by said sound source

02:15:54   15 localization unit. Do you see that?

02:15:55   16 A. The highlight -- the highlight yellow part?

02:15:59   17 Q. Yes, Dr. Zhu.

02:16:00   18 A. Okay.

02:16:01   19 Q. Do you see that?

02:16:03   20 A. Yes.

02:16:04   21 Q. And -- and that sound source localization unit is what

02:16:12   22 locates the target sound source; isn't that right, Dr. Zhu?

02:16:18   23 A. Yes.

02:16:24   24 Q. Okay. And the -- and if we look at -- strike that.

02:16:30   25 Let me ask a better question.

02:16:32   1   Now, the purpose of Claim 1 --

02:16:36   2   THE COURT: Don't tell us you're going to ask a

02:16:38   3   better question, just ask a better question.

02:16:40   4   MR. HADDEN: I'm sorry, Your Honor.

02:16:41   5   THE COURT: If it's not a question, it's a

02:16:43   6   statement to the jury.

02:16:44   7   MR. HADDEN: Apologize, Your Honor.

02:16:46   8   Q. (By Mr. Hadden) The estimating a spatial location of

02:16:49   9   said target sound signal of said received sound signal --

02:17:04 10   sorry, by said sound source localization unit in Claim 1 is

02:17:07 11   done so that the determining step can be performed using

02:17:09 12   the azimuth angle to the target sound signal. Isn't that

02:17:13 13   correct, Dr. Zhu?

02:17:14 14   A. Can you repeat your question?

02:17:19 15   Q. Sure. You need to estimate the spatial location of

02:17:22 16   said target sound signal in Claim 1 in order to calculate

02:17:28 17   the delay using an azimuth angle between said reference

02:17:33 18   axis and said -- said target sound signal. Isn't that

02:17:37 19   correct, Dr. Zhu?

02:17:46 20   A. I'm sorry, can I pardon you again? Yeah.

02:17:50 21   Q. Sure. Let -- let me -- let me maybe try a different --

02:17:58 22   let me ask a different question.

02:18:03 23   MR. HADDEN: Let me ask you to go to Figure 2 of

02:18:05 24   the patent, please, Mr. Berk. And if we blow up -- there's

02:18:09 25   a box in Figure 2, 202, that says sound source localization

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02:18:14   1   unit.

02:18:15   2   Q.   (By Mr. Hadden)   Do you see that, Dr. Zhu?

02:18:17   3   A.   I saw that.

02:18:20   4   Q.   And above that there's 201.   That's the array of sound

02:18:25   5   sensors; do you see that?   Those are the microphones that

02:18:27   6   we were talking about; isn't that right?

02:18:29   7   A.   Yes.

02:18:30   8   Q.   Okay.   And the arrow goes from the sound source

02:18:35   9   localization unit 202 to a box that says adaptive

02:18:41  10   beamforming unit 203.   Do you see that, Dr. Zhu?

02:18:44  11   A.   Yes.

02:18:44  12   Q.   And in this diagram, the adaptive beamforming unit

02:18:49  13   takes as an input, the output of the sound source

02:18:55  14   localization unit; isn't that right, Dr. Zhu?

02:18:58  15   A.   Last sentence repeat, please?

02:19:01  16   Q.   The adaptive beamforming unit 203 receives as an input,

02:19:07  17   the output of the sound source localization unit, the box

02:19:16  18   202, do you --

02:19:17  19   A.   It's just one of the way to implement that, those three

02:19:22  20   units working together, yeah.

02:19:24  21   Q.   But in this figure --

02:19:26  22   A.   In this figure -- I'm sorry, I interrupt you.   I'm

02:19:32  23   sorry.

02:19:32  24   Q.   No, it's okay.

02:19:33  25        In this figure -- in this Figure 2, the output of
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02:19:41   1   the sound source localization unit 202 is provided as an

02:19:43   2   input to the adaptive beamforming unit 203; is that

02:19:46   3   correct?

02:19:46   4   A.   Oh, this arrow shows those two units are connected to

02:19:50   5   each other.

02:19:51   6   Q.   Well, the diagram shows an arrow going from sound

02:20:01   7   source localization unit 202 to adaptive beamforming unit

02:20:03   8   203; do you see that?

02:20:04   9   A.   Yes.

02:20:05   10   Q.   Doesn't that arrow indicate that the sound source

02:20:09   11   localization unit is providing information to the adaptive

02:20:13   12   beamforming unit?

02:20:13   13   A.   Yeah, in this special case, it is.

02:20:16   14   Q.   And the sound source localization unit provides that

02:20:21   15   information to the adaptive beamforming unit so it will

02:20:26   16   know the angle to the target sound source, right?

02:20:30   17   A.   In this special case, it is.

02:20:32   18   Q.   Okay.

02:20:45   19   MR. HADDEN: Can we look at Figure 5, please,

02:20:48   20   Mr. Berk?   Can we blow that up, please?

02:21:00   21   Q.   (By Mr. Hadden)   Now, Figure 5 in your '049 patent

02:21:06   22   shows a circular microphone array.   Is that correct,

02:21:10   23   Dr. Zhu?

02:21:14   24   A.   Yes.

02:21:15   25   Q.   And the microphones are indicated by the letters M

02:21:19	1	around the circle. Is that correct, Dr. Zhu?
02:21:23	2	A. Yes.
02:21:23	3	Q. Okay. And the arrow that says target sound signal,
02:21:38	4	that's the arrow pointing to the target sound source, what
02:21:47	5	the microphone array is going to try to focus on to hear.
02:21:51	6	Isn't that correct, Dr. Zhu?
02:21:52	7	A. Yeah, no matter which direction the sound is coming
02:21:59	8	from. So that's not the sound I'm going to focus. That's
02:22:04	9	a general indication if the sound coming from here.
02:22:08	10	Q. The label is target sound signal. Doesn't that
02:22:17	11	indicate that that is the sound that the array is going to
02:22:20	12	try to focus on?
02:22:21	13	A. No. It's how you -- because, like I said before, sound
02:22:27	14	coming from all directions.
02:22:33	15	Q. But don't you --
02:22:35	16	A. So the formula will take the sound coming from all
02:22:38	17	directions. So this formula works for sound coming from
02:22:42	18	all directions. So assuming the sound coming from this
02:22:45	19	direction, what you can get, yeah.
02:22:47	20	Q. Right. So doesn't target sound signal, the arrow in
02:22:52	21	Figure 5, doesn't that indicate that that is, in this
02:22:57	22	figure, the arrow to the source that you want to listen to?
02:23:02	23	Isn't that why it's called a target sound signal?
02:23:07	24	A. I don't think that's this target sound to mean, yeah,
02:23:12	25	it's not.

02:23:13   1   Q.   So you don't think that the target sound is the sound

02:23:21   2   that the array is trying to listen to?

02:23:22   3   A.   Yeah, like I say, it's a general --

02:23:29   4   Q.   Well, you have some --

02:23:34   5   A.   Give me a second.

02:23:36   6   Q.   Sure.

02:23:38   7   A.   I try to rephrase. Yeah, so, for that one, you have a

02:23:46   8   formula, you have any kind of input you can fit into it.

02:23:49   9   So before you get results, you don't know whether this

02:23:53   10   sound going to be suppressed or enhanced. So it's -- it's

02:24:12   11   an extra step with determine. I'm going to suppress it or

02:24:16   12   I'm going to enhance it, but that's the general inputs.

02:24:22   13   Q.   Correct. And so the purpose of performing your

02:24:28   14   adaptive beamforming is to create a beam that will enhance

02:24:33   15   sounds coming from this target sound signal direction.

02:24:39   16   Isn't that right, Dr. Zhu?

02:24:40   17   A.   Yes.

02:24:43   18   Q.   Okay. And -- and to do that, you start with the

02:24:50   19   direction of the target sound that you want to enhance.

02:24:55   20   Isn't that right, Dr. Zhu?

02:24:56   21   A.   Yes.

02:24:57   22   Q.   And that's shown in this Figure 5, isn't that right,

02:25:01   23   Dr. Zhu, by that arrow?

02:25:02   24   A.   That's -- this figure is example to show how to

02:25:21   25   calculate the delay -- a method to calculate the delay. So

02:25:30   1   this figure doesn't show I want to increase the sound

02:25:33   2   coming from this direction.

02:25:36   3   Q.   Yes.   So the purpose of calculating the delays in your

02:25:42   4   patent, isn't it, Dr. Zhu, is to be able to create those

02:25:47   5   weights, W_1, W_2, et cetera, that you apply the outputs to

02:25:54   6   the different microphones in order to perform that

02:25:58   7   filter-and-sum beamforming.   Isn't that right?

02:26:08   8   A.   The purpose of the delay is to determine the parameters

02:26:12   9   we want to use to enhance the sound.

02:26:13   10   Q.   Right.   So we first find out what the direction of the

02:26:19   11   target sound you want to enhance is, and then you determine

02:26:21   12   the delays from each microphone based on the angle to that

02:26:26   13   target sound and the geometry that you showed here in

02:26:30   14   Figure 5 of the microphones, and then once you calculate

02:26:33   15   those delays, you use those to form those beamforming

02:26:38   16   weights that you use to create that enhancing profile.

02:26:42   17   Isn't that correct, Dr. Zhu?

02:26:44   18   A.   We use the delays to determine the parameters we want

02:26:57   19   to do for the beamforming.

02:26:58   20   Q.   Right.   So you first find what it is you want to listen

02:27:01   21   to, you find the angle to that target sound source, you

02:27:04   22   then calculate the delays using formulas based on what you

02:27:09   23   see here in Figure 5, and then after you've calculated

02:27:12   24   those delays, you create parameters in order to create a

02:27:18   25   beam that enhances in the direction of this arrow target

02:27:24   1   sound signal. Isn't that right, Dr. Zhu?

02:27:25   2   A.   It's on the delay -- we don't know where the target

02:27:41   3   sound coming from. We manipulate all the signals, we

02:27:48   4   determine where the sound coming from. So it's not like we

02:27:53   5   know the target, we calculate the delay. No, it's not this

02:27:58   6   procedure. It's we don't know where the sound coming from.

02:28:02   7   We need to manipulate all the signals and determine where

02:28:05   8   the sound coming from, and then we use that to determine

02:28:08   9   the parameters of our beamforming.

02:28:10 10   Q.   So it's your testimony, Dr. Zhu, that in your patent,

02:28:18 11   you don't know the direction of the target sound signal

02:28:20 12   when you calculate the delays?

02:28:23 13   A.   Repeat the question.

02:28:28 14   Q.   Sure. Is it your testimony that in your patent, the

02:28:31 15   '049 patent, you calculate the delays without knowing

02:28:34 16   direction of the target sound signal that you want to

02:28:36 17   enhance?

02:28:37 18   A.   Yeah, we -- we use the delay to determine where the

02:28:43 19   sound coming from. This not -- we know the sound coming

02:28:47 20   from that direction, we determine the delay. So the -- the

02:28:50 21   order is not like that.

02:28:51 22   Q.   Well, then let's look back at Claim 1 of your patent,

02:29:00 23   then, Dr. Zhu?

02:29:01 24   MR. HADDEN: Can we see that again?

02:29:03 25   Q.   (By Mr. Hadden) Now, when you talk about you determine

02:29:05   1   the direction that the sound is coming from, is that done

02:29:09   2   by the sound source localization unit, Dr. Zhu?

02:29:25   3   A.   Repeat your question, please.

02:29:28   4   Q.   Sure.   You just told me that you use the delays to

02:29:32   5   determine where the sound is coming from.   Isn't that what

02:29:35   6   you said?

02:29:35   7   A.   Yes.

02:29:36   8   Q.   And is that done using the sound source localization

02:29:42   9   unit?

02:29:42   10   A.   Yeah, that delay was used both in sound source

02:29:50   11   localization and also in the beamforming.

02:29:51   12   Q.   Well, there's a delay that you measure, and that's what

02:29:54   13   you use in estimating the spatial location, the target in

02:29:57   14   the sound source localization unit.   Isn't that right,

02:29:59   15   Dr. Zhu?

02:29:59   16   A.   Repeat the last question.

02:30:01   17   Q.   There's a delay that you measure as part of that

02:30:05   18   SRP-PHAT algorithm that we talked about that is used to

02:30:09   19   determine the location of the sound source in the sound

02:30:14   20   source localization unit, right?

02:30:15   21   A.   The delay was -- the delay was not matter.   The delay

02:30:25   22   was, like, after all this calculation, you got that.   Yeah.

02:30:32   23   Q.   Well, let's be clear.   The delay that is calculated is

02:30:37   24   not used to determine the location of the target sound

02:30:42   25   source; it's used to determine the beamforming weights,

02:30:45   1 right?

02:30:45   2 A.   The delay will determine -- we used for both locate the

02:30:50   3 sound and adjusted the -- look at the parameters for the

02:30:54   4 beamforming.

02:30:56   5   MR. HADDEN: Well, if we go back to Figure 5.   Can

02:31:01   6 we go to Figure 5 again?

02:31:11   7 Q.   (By Mr. Hadden)   Now, Figure 5 shows some delays.

02:31:15   8 Those are the tau 1 and tau 3, little t's.

02:31:22   9   MR. HADDEN: Can we highlight one of those,

02:31:24 10 Mr. Berk, please?

02:31:25 11 A.   Yes.

02:31:26 12 Q.   (By Mr. Hadden)   Right.   Those are the delays; is that

02:31:29 13 right, Dr. Zhu?

02:31:29 14 A.   Yeah, right, those are the delay.

02:31:32 15 Q.   And to calculate those, you need first to know where

02:31:35 16 that target sound signal arrow is, don't you, Dr. Zhu?

02:31:38 17 A.   I need to know the sound signal -- I couldn't recall

02:32:01 18 the specific formula it works, but -- but you don't need

02:32:14 19 the sound...

02:32:26 20 Q.   Doesn't Figure 5 show you use this angle to the target

02:32:31 21 sound signal in order to geometrically calculate --

02:32:34 22 A.   You take --

02:32:35 23   THE COURT: Just -- just a minute.

02:32:36 24   THE WITNESS: Yes.

02:32:37 25   THE COURT: We're going to talk one at a time in

02:32:39   1   here.

02:32:39   2   THE WITNESS: Yes.

02:32:40   3   THE COURT: I know these are technical questions,

02:32:41   4   but it's important that each of you speak one at a time.

02:32:45   5   Restate your question.

02:32:48   6   Then when he's finished, please answer.

02:32:50   7   MR. HADDEN: Thank you, Your Honor.

02:32:50   8   Q.   (By Mr. Hadden) So in Figure 5, to calculate those tau

02:32:54   9   delays, you need to know the angle to the target sound

02:33:00   10 signal; isn't that correct, Dr. Zhu?

02:33:01   11 A.   The formulation works like you're assuming the sounds

02:33:14   12 are coming from all directions. That's a formulation

02:33:21   13 without input.

02:33:22   14   So before we put the device into field to test,

02:33:27   15 when we calculate the parameters, we don't know where the

02:33:35   16 sound is coming from. We're assuming it's coming from each

02:33:39   17 directions, and we formulate location. And when the real

02:33:46   18 sound comes in, by some calculation we know where the sound

02:33:52   19 is coming from.

02:33:53   20 Q.   But to calculate --

02:33:55   21 A.   So -- go ahead.

02:33:56   22 Q.   To calculate the delay, it's -- and we can see the

02:33:59   23 output of those calculations in Figure 6A.

02:34:02   24   MR. HADDEN: Could you put that up next to

02:34:04   25 Figure 5, please, Mr. Berk? You just -- yeah, just blow up

02:34:33   1   Figure 5, please, and Figure 6A, if you could.

02:34:41   2   Q.   (By Mr. Hadden)   Now, if we look at these two figures,

02:34:43   3   you understand, don't you, Dr. Zhu, that the -- Table 6A is

02:34:47   4   showing the delay for each of the microphones from that

02:34:54   5   origin that is calculated based on the geometry that is

02:35:00   6   shown in Figure 5; isn't that correct, Dr. Zhu?

02:35:03   7   A.   Yes.

02:35:07   8   Q.   Okay.   And those delay calculations depend, as we saw

02:35:12   9   when we were looking at Figure 3 and your 2009 paper, would

02:35:18   10   depend on the angle to each of the microphones.   And they

02:35:25   11   also depend on this angle, which is theta, which is the

02:35:30   12   angle from the Y axis shown in Figure 5 to the target sound

02:35:35   13   signal.   Isn't that right, Dr. Zhu?

02:35:37   14   A.   Yeah.

02:35:38   15   Q.   So to calculate this delay, you need to know direction

02:35:47   16   to the target sound signal.   That's that angle theta that

02:35:51   17   is in each of the calculations of the delay that you have

02:35:55   18   in Figure 6A.   Isn't that right, Dr. Zhu?

02:36:01   19   A.   In this way to calculate the calculation, it's more

02:36:12   20   like you -- you -- you predefine if the sound coming from

02:36:21   21   that direction.   And that's -- give you a formula, if that

02:36:27   22   sound coming from that direction.   It just to give you a

02:36:30   23   formula.   Only when the sound comes in, it can generate

02:36:36   24   output for you.

02:36:36   25   Q.   Okay.

02:36:36   1   A.   So there are formulas for all directions, and when the

02:36:44   2   real input comes in, all of this formulas will give you

02:36:48   3   some output.

02:36:51   4   Then we can determine from those output, we know,

02:36:56   5   okay, the sound is coming from this direction because

02:37:00   6   that's what give you -- largest value, least value, or some

02:37:05   7   value different from all the other outputs. So that's why

02:37:08   8   -- how we can determine the sound coming from. That's not

02:37:14   9   predefined. The predefined is just the formula.

02:37:18   10   But the real -- real input comes in, all these

02:37:23   11   formulas will give outputs.

02:37:27   12   Q.   Well, you have to use --

02:37:27   13   A.   Yeah.

02:37:29   14   Q.   -- the formula to calculate the delay in Claim 1 with

02:37:34   15   respect to the received target sound signal; isn't that

02:37:40   16   right, Dr. Zhu?

02:37:41   17   A.   Yeah, you have your ways to determine how to formulate

02:37:45   18   this formula, yeah.

02:37:47   19   Q.   So --

02:37:47   20   A.   So this give you -- Figure 6A give you a special case

02:37:52   21   how you do this formula for this case.

02:37:54   22   Q.   So when you have a sound signal, you have to determine

02:37:59   23   what direction it's coming from. And then in Claim 1,

02:38:03   24   using that direction and this formula that you have in 6A,

02:38:08   25   you calculate the delays for each of the microphones.

02:38:11	1	Isn't that right, Dr. Zhu?
02:38:13	2	A. The 6A give you specific examples how you can formulate
02:38:21	3	it.
02:38:22	4	Q. And that specific example, like the language that we
02:38:25	5	looked at in Claim 1, requires the distance from the origin
02:38:31	6	to the particular microphone, which is if we look at the
02:38:36	7	first row in 6A, that's that d, right? D is the distance;
02:38:44	8	isn't that right, Dr. Zhu?
02:38:45	9	A. Yes, d is distance.
02:38:48	10	Q. And then there is an angle to the microphone from this
02:38:53	11	reference axis, which is Y in Figure 5, and that is the
02:38:58	12	angle phi, which is a zero with a line coming down, as we
02:39:07	13	see in each of the rows of the table in 6A, right? That's
02:39:08	14	the predefined angle to that microphone in the array; isn't
02:39:13	15	that right, Dr. Zhu?
02:39:15	16	A. Yes, this figure shows that.
02:39:16	17	Q. Okay. And then we saw in Figure -- in Claim 1 that
02:39:24	18	there was another angle that was needed, and that was the
02:39:26	19	angle to the received target sound signal.
02:39:28	20	And in Figure 6A, it's the angle theta that we see
02:39:32	21	here as the angle between the Y axis and the target sound
02:39:36	22	signal; isn't that right, Dr. Zhu?
02:39:38	23	A. Can you repeat your last sentence?
02:39:46	24	Q. Sure. So the second angle that is required to
02:39:50	25	calculate the delay for each microphone, both in Figure 6A

02:39:57 1 and as we saw in the language of Claim 1, is this azimuth

02:40:02 2 angle between a reference axis and the target sound signal.

02:40:07 3   And in Figure 5, that is indicated as the Greek

02:40:12 4 letter theta. And it is this angle between the Y axis and

02:40:15 5 the target sound signal. And we see that in each of the

02:40:19 6 rows of Table 6A where you have the calculated delay.

02:40:24 7 Isn't that right, Dr. Zhu?

02:40:25 8 A. Yeah, people need to use those or spatial relationship

02:40:29 9 to formulate -- calculate the delay -- determines a delay,

02:40:35 10 yeah.

02:40:35 11 Q. And that delay will be different, depending on what

02:40:38 12 angle you're looking at, at the target sound signal, right,

02:40:45 13 because it's a function of that angle theta; isn't that

02:40:49 14 right, Dr. Zhu?

02:40:49 15 A. Yes.

02:40:50 16 Q. Thank you.

02:40:51 17   MR. HADDEN: And if we look at -- go to --

02:40:56 18   THE COURT: Mr. Hadden, what's your best estimate

02:40:59 19 of your remaining cross?

02:41:00 20   MR. HADDEN: Maybe 25 minutes, Your Honor. But if

02:41:05 21 we can break now, that's fine, too.

02:41:08 22   THE COURT: Well, we've been back from lunch

02:41:10 23 nearly two hours. We're going to take a recess at this

02:41:13 24 point.

02:41:14 25   Ladies and gentlemen of the jury, if you'll close

02:41:16   1   your notebooks and leave them in your chairs, follow all

02:41:18   2   the instructions I've given you, including don't discuss

02:41:21   3   the case among yourselves. We'll be back shortly and

02:41:24   4   continue with the Defendants' cross-examination of this

02:41:25   5   witness.

02:41:25   6   The jury is excused for recess.

02:41:27   7   COURT SECURITY OFFICER: All rise.

02:41:28   8   (Jury out.)

02:41:29   9   THE COURT: I'd like to see Mr. Hadden and

02:41:59 10   Mr. Dacus, Mr. Lambrianakos and Mr. Fabricant and

02:42:06 11   Mr. Baxter in chambers, please.

02:42:17 12   The Court stands in recess.

02:42:19 13   COURT SECURITY OFFICER: All rise.

02:42:20 14   (Recess.)

03:04:36 15   (Jury out.)

03:04:38 16   COURT SECURITY OFFICER: All rise.

03:04:40 17   THE COURT: Be seated, please.

03:06:32 18   Mr. Hadden, are you prepared to continue with your

03:06:41 19   cross-examination?

03:06:42 20   MR. HADDEN: I am, Your Honor.

03:06:43 21   THE COURT: All right. Let's bring in the jury,

03:06:45 22   please.

03:06:45 23   COURT SECURITY OFFICER: All rise.

03:06:46 24   (Jury in.)

03:06:47 25   THE COURT: Please be seated.

03:07:15   1   We'll continue with the Defendants'

03:07:20   2   cross-examination of Dr. Zhu.

03:07:23   3   All right. Counsel, please proceed.

03:07:26   4   MR. HADDEN: Thank you, Your Honor.

03:07:26   5   Q. (By Mr. Hadden) Hello, Dr. Zhu.

03:07:28   6   A. Hello.

03:07:29   7   Q. Looking again at Claim 1 of your '049 patent, Dr. Zhu,

03:07:36   8   if we look at the receiving element --

03:07:41   9   MR. HADDEN: Will you blow that up, Mr. Berk?

03:07:44 10   Q. (By Mr. Hadden)   -- this element requires receiving

03:07:51 11   sound signals from a plurality of disparate sound sources.

03:07:55 12   Do you see that, Dr. Zhu?

03:07:57 13   A. Yes.

03:07:57 14   Q. And one of the things that has to be received is sound

03:08:01 15   signals from said target -- one of the things that has to

03:08:05 16   be received is sound signals from a target sound source.

03:08:11 17   Do you see that, Dr. Zhu?

03:08:13 18   A. Yes.

03:08:14 19   Q. Thank you.

03:08:14 20   And then in the determining step that we were

03:08:17 21   talking about earlier, that determining the delays requires

03:08:26 22   using an azimuth angle between said reference axis and said

03:08:33 23   target sound signal.

03:08:34 24   Do you see that, Dr. Zhu?

03:08:38 25   MR. HADDEN: Can we blow that up, Mr. Berk?

03:08:42   1   A.   Just --

03:08:44   2   Q.   (By Mr. Hadden)   Just -- just a second, and he'll have

03:08:46   3   it.

03:08:50   4   So if we look at the last part of what Mr. Berk

03:08:52   5   has blown up, it requires an azimuth angle between said

03:08:56   6   reference axis and said target sound signal.   Do you see

03:09:00   7   that, Dr. Zhu?

03:09:03   8   A.   Yes.

03:09:03   9   Q.   And so to use or to calculate a delay using the angle

03:09:08 10   between said reference axis and said target sound signal,

03:09:11 11   the system has to have received that target sound signal in

03:09:16 12   the receiving step.   Isn't that right, Dr. Zhu?

03:09:19 13   A.   Yes.

03:09:23 14   Q.   Okay.

03:09:24 15   MR. HADDEN: And then if we go on to the

03:09:28 16   performing adaptive beamforming step, if we could,

03:09:33 17   Mr. Berk.

03:09:35 18   Q.   (By Mr. Hadden)   Claim 1 then requires performing

03:09:42 19   adaptive beamforming for steering a directivity pattern of

03:09:47 20   said array of said sensors in a direction of said spatial

03:09:51 21   location of said target sound signal by said adaptive

03:09:57 22   beamforming unit.

03:09:57 23   Do you see that, Dr. Zhu?

03:09:59 24   A.   Yes.

03:09:59 25   Q.   So after the target sound signal has been received and

03:10:05 1 after the delays are calculated based on the angle to that

03:10:11 2 target sound signal, the system then has to adaptively

03:10:16 3 beamform to provide a steering -- to be able to steer a

03:10:23 4 directivity pattern in the direction of that target sound

03:10:26 5 signal. Isn't that right, Dr. Zhu?

03:10:28 6 A. When the sound source location -- I -- I need you

03:10:51 7 repeat your question, please.

03:10:52 8 Q. Sure. So after the sound signal is received and the

03:10:57 9 weights -- the delays are determined using the angle to

03:11:01 10 that target sound signal, the claim then requires

03:11:06 11 performing this adaptive beamforming for steering a

03:11:11 12 directivity pattern of said sound sensors in a direction of

03:11:15 13 said spatial location of the target sound signal.

03:11:19 14   Isn't that correct?

03:11:21 15 A. Yeah. Once some location was determined, that -- that

03:11:26 16 delay also used to -- yeah, put into the beamforming to

03:11:31 17 form the direction to that sound.

03:11:32 18 Q. And the beamforming in the direction of that sound --

03:11:40 19 target sound signal is done by adjusting those weights,

03:11:46 20 those Ws we saw in the filter-and-sum formula. Isn't that

03:11:55 21 right, Dr. Zhu?

03:11:56 22 A. Yes, that's part of the -- adaptive beamforming has two

03:12:05 23 steps. First step is fixed beamforming. So in that step,

03:12:10 24 we use some precalculated filter to point to that

03:12:14 25 direction. And adaptive also further suppression the

03:12:22   1   background -- the background noise.

03:12:24   2   So -- so how to say that? We have some

03:12:50   3   precalculated filter there, and when sound source

03:12:58   4   localization -- when sound source location determined, we

03:13:03   5   further of adjusting those parameters.

03:13:04   6   Q.   Those parameters that you adjust are the weight and

03:13:08   7   multiply the outputs of the microphones as part of that

03:13:12   8   filter-and-sum equation; isn't that right, Dr. Zhu?

03:13:16   9   A.   It's not a pure sum -- as sum calculations.

03:13:25   10   Q.   Well, and the result of that is what is shown in

03:13:31   11   Figures 16 of the patent, Figures 16E, F, and it goes on

03:13:37   12   through L. Do you see those, Dr. Zhu?

03:13:40   13   MR. HADDEN: Can we show Figures 16E and 16F,

03:13:45   14   Mr. Berk? There we go. Thank you.

03:14:03   15   Q.   (By Mr. Hadden) So Figure 16E shows one of these

03:14:08   16   directivity patterns of said array of said sound systems

03:14:14   17   pointing in a direction of a target sound signal; isn't

03:14:16   18   that right, Dr. Zhu?

03:14:19   19   A.   Yes.

03:14:20   20   Q.   Okay. And another example of that, if the target sound

03:14:24   21   signal was in a different direction, it is 16F, right below

03:14:27   22   it?

03:14:28   23   A.   Yes.

03:14:28   24   Q.   Okay. Thank you.

03:14:29   25   MR. HADDEN: Can we get DTX-685, please, Mr. Berk?

03:14:44   1   Q.   (By Mr. Hadden)   Now, this is a data sheet for that

03:14:49   2   VoiceFocus conference phone that you said that you worked

03:14:51   3   on I think between 2007 and 2009.   Was that right, Dr. Zhu?

03:15:00   4   A.   Yeah, that document is in 2009.   Yeah.

03:15:06   5   MR. HADDEN: And if we could blow up at the

03:15:08   6   bottom, Mr. Berk, the advanced DSP algorithms.

03:15:15   7   A.   Yes.

03:15:15   8   Q.   (By Mr. Hadden)   And this has a listing of these

03:15:17   9   advanced DSP algorithms, adaptive beamforming, sound source

03:15:22   10 localization, adaptive echo cancellation, and adaptive

03:15:27   11 noise reduction/speech enhancement.   Do you see that,

03:15:32   12 Dr. Zhu?

03:15:33   13 A.   Yes.

03:15:33   14 Q.   And isn't it true that you were never able to implement

03:15:36   15 those four algorithms in the VoiceFocus conference phone?

03:15:39   16 A.   Yeah, the VoiceFocus conference phone is a dummy

03:15:47   17 device.   Those -- those algorithms was implemented in a

03:15:51   18 prototype but not in a stand-alone device like a

03:15:57   19 VoiceFocus.

03:16:02   20 Q.   So it's true, isn't it, Dr. Zhu, that these four

03:16:07   21 algorithms are not implemented in the VoiceFocus conference

03:16:11   22 phone?

03:16:11   23 A.   Not in this device.   There's code implemented on that

03:16:18   24 top.

03:16:18   25   MR. HADDEN: Now, can we go to Plaintiff's 258,

03:16:21 1 please, Mr. Berk?

03:16:23 2 Q. (By Mr. Hadden) So this is another version of the

03:16:30 3 voice conference phone data sheet that you were shown by

03:16:32 4 Vocalife's counsel. Isn't that correct, Dr. Zhu?

03:16:35 5 A. Yes.

03:16:39 6 Q. And it has this badge for the CES award from 2011. Do

03:16:46 7 you see that, Dr. Zhu?

03:16:47 8 A. Yes.

03:16:47 9 Q. And this device that won the award is what you just

03:16:51 10 referred to as a dummy device; isn't that correct, Dr. Zhu?

03:16:55 11 A. It is.

03:16:55 12 Q. So this device that won the award didn't do anything;

03:17:00 13 is that correct?

03:17:00 14 A. Yeah, we planned to implement all the algorithm in the

03:17:05 15 stand-alone device, but we couldn't do it at this time. It

03:17:10 16 only showed a lifetime on the laptop.

03:17:13 17 Q. So the award was for -- was for the way the device

03:17:16 18 looked, because the device, in fact, didn't do anything.

03:17:21 19 Isn't that correct, Dr. Zhu?

03:17:21 20 A. Yes, this is a design award.

03:17:24 21 Q. Thank you.

03:17:24 22   MR. HADDEN: Let me ask, Mr. Berk, can you pull up

03:17:33 23 DTX-980? Go to, I'm sorry, 980A, Mr. Berk. Could we blow

03:17:58 24 up the I hereby -- I hereby acknowledge?

03:18:08 25 Q. (By Mr. Hadden) Now, this, Dr. Zhu, is a declaration

03:18:20 1 that you signed in July of this year, 2020. Is that

03:18:24 2 correct, Dr. Zhu?

03:18:24 3 A. Yes.

03:18:25 4 Q. Okay. And if we look at the top of what's on the

03:18:31 5 screen, it says: I hereby acknowledge that any willful

03:18:36 6 false statement made in this declaration is punishable

03:18:41 7 under 18 U.S.C. 1001 by fine or imprisonment of not more

03:18:47 8 than five years or both.

03:18:49 9   Do you see that, Dr. Zhu?

03:18:50 10 A. Yes.

03:18:51 11 Q. Did you read that before you signed this declaration?

03:18:55 12 A. I -- I read that.

03:18:58 13 Q. And you understood that signing a declaration under

03:19:04 14 oath and submitting it to the U.S. Government is a serious

03:19:08 15 thing, didn't you, Dr. Zhu?

03:19:10 16 A. Yes.

03:19:10 17 Q. Okay. And in this declaration, it reads here --

03:19:21 18   MR. HADDEN: Can we highlight the "I believe"?

03:19:27 19 Q. (By Mr. Hadden) It says here: I believe the original

03:19:30 20 patent to be wholly or partly inoperative or invalid, the

03:19:38 21 reason described below.

03:19:39 22   And then there's a box checked "by reason of other

03:19:43 23 errors."

03:19:46 24   Do you see that?

03:19:47 25 A. Yes.

03:19:47 1   Q.   And when you filed this declaration under oath, did you

03:19:50 2   believe that the original patent was wholly or partly

03:19:54 3   interop -- inoperative or invalid because of other errors?

03:20:00 4   A.   When -- when -- when we filed this reissue, we want to

03:20:04 5   broaden our claims, and those words are in the document as

03:20:12 6   it is.   So we -- we know that's part of the document, yeah.

03:20:18 7   MR. HADDEN: Objection, Your Honor.   Move to

03:20:20 8   strike, non-responsive.

03:20:30 9   A.   No, I don't believe my patent is inoperative or

03:20:38 10 invalid.

03:20:38 11   THE COURT: All right.   I'll overrule the

03:20:39 12 objection.

03:20:40 13   MR. HADDEN: Thank you, Your Honor.

03:20:48 14 Q.   (By Mr. Hadden)   Now, if you look on this same page, it

03:21:07 15 identifies a limitation.

03:21:10 16   MR. HADDEN: If you can highlight that, Mr. Berk.

03:21:14 17 Q.   (By Mr. Hadden)   It's on providing a microphone array

03:21:20 18 system.   Do you see that, Dr. Zhu?

03:21:23 19 A.   If you give me a second to finish reading.

03:21:26 20 Q.   Certainly.

03:21:32 21 A.   Yeah, that's a limitation.

03:21:34 22 Q.   Okay.   And you understood when you filed this

03:21:39 23 declaration under oath and you checked "by reason of other

03:21:44 24 errors," that the error was in this limitation that is

03:21:49 25 being included on the front of this declaration.   Isn't

03:21:52 1 that right, Dr. Zhu?

03:21:53 2 A. I check this error -- first, the -- yeah, by error we

03:22:03 3 mean the claim has limitation.

03:22:09 4 Q. Did you understand that the error that you were

03:22:13 5 pointing out to the United States Patent Office was in the

03:22:16 6 limitation language that you -- we have highlighted here

03:22:18 7 and is quoted in this declaration?

03:22:21 8 A. Yeah, I understand that the error means the claim has

03:22:24 9 limitation. That's my understanding.

03:22:29 10 Q. Okay. So you didn't understand that the language that

03:22:35 11 is quoted here under "the limitation, colon," itself

03:22:43 12 includes an error?

03:22:45 13 A. This sentence in this quotation mark -- there's no

03:22:48 14 error in this sentence. So --

03:22:50 15   MR. HADDEN: Okay. Can we go -- can we go to the

03:22:56 16 attached sheet, Mr. Berk? Can we blow this up?

03:23:12 17 Q. (By Mr. Hadden) If we go -- so this is, Dr. Zhu, the

03:23:16 18 attached sheet that was attached to this declaration that

03:23:19 19 we've been discussing, to further explain the error. Isn't

03:23:24 20 that correct, Dr. Zhu?

03:23:25 21 A. Can you repeat your question?

03:23:28 22 Q. Sure. So I'm just -- the sheet that I am showing you

03:23:31 23 now --

03:23:31 24 A. Yes.

03:23:32 25 Q. -- this attached sheet to this declaration that is

03:23:39   1   further explaining to the Patent Office the error that is

03:23:43   2   pointed out and checked "by reason of other errors" that we

03:23:49   3   looked at on the front of DTX-980A?

03:23:52   4   A.   Yes, that's explanation to the error, yeah.

03:23:56   5   Q.   Okay. So if we look at what is explained here --

03:24:01   6   MR. HADDEN: If we highlight starting in the

03:24:03   7   middle, Mr. Berk, where it says "it is wrong."

03:24:10   8   Q.   (By Mr. Hadden) So what you told the Patent Office

03:24:18   9   under oath in this declaration, that it is wrong to recite

03:24:23 10   that the source sound localization unit, the adaptive

03:24:27 11   beamforming unit, and the noise reduction unit are in

03:24:31 12   operative communication with the array of sound sensors.

03:24:35 13   Do you see that?

03:24:37 14   MR. BAXTER: I object, Your Honor. He started

03:24:38 15   reading right in the middle of that sentence. If he wants

03:24:41 16   to show it to her, he needs to start at the beginning.

03:24:45 17   THE COURT: So your objection is?

03:24:49 18   MR. BAXTER: It's incomplete and misleading.

03:25:07 19   THE COURT: He's entitled to ask the question. If

03:25:09 20   it's misleading, you can certainly address it on redirect.

03:25:12 21   I agree it starts in the middle of the sentence, but it's

03:25:15 22   his prerogative to ask the question as he chooses to.

03:25:19 23   It's overruled.

03:25:21 24   MR. BAXTER: Thank you, Judge.

03:25:23 25   MR. HADDEN: Thank you, Your Honor.

03:25:23   1   Q. (By Mr. Hadden) So do you see the highlighted

03:25:25   2   language, Dr. Zhu, that says, "it is wrong to recite"?

03:25:30   3   A.   Yeah, I saw that sentence.

03:25:32   4   Q.   And what it says here that is wrong to recite, that is

03:25:39   5   the actual language of Claim 1 of the '049 patent. Isn't

03:25:45   6   that right, Dr. Zhu?

03:25:46   7   A.   No. First, the -- this original is based on the

03:25:58   8   original patent, not the '049. I think it's '756, if I

03:26:04   9   remember the number correctly, the original patent. So

03:26:09 10   this is not the reissue for '049. It's for the original

03:26:14 11   one.

03:26:15 12   Q.   Okay. But --

03:26:16 13   A.   Yeah.

03:26:17 14   Q.   -- let's look at the language from Claim 1 of the '049

03:26:21 15   patent.

03:26:21 16   MR. HADDEN: Can we do that, Mr. Berk?

03:26:27 17   A.   If you read the whole sentence, you understand this --

03:26:31 18   it is wrong means limit the claim to the highlighted part.

03:26:39 19   It's wrong. We should have broaden it. So limit it, it's

03:26:44 20   wrong. So if you read the whole paragraph here.

03:26:51 21   Q.   (By Mr. Hadden) So let's look at the language that you

03:26:53 22   told the Patent Office under oath was wrong and the

03:26:59 23   language that exists in Claim 1 of the '049 patent that is

03:27:03 24   being asserted here.

03:27:08 25   A.   Yeah, by it's wrong, we mean the patent was not written

03:27:13   1   as broad as it should be, and that's a limitation. We

03:27:21   2   should not limit our claim to that. That is wrong. We

03:27:25   3   should broaden it.

03:27:28   4   Q. Now, if we look at the language in Claim 1, and it's

03:27:34   5   italicized. It says: Wherein said sound source

03:27:38   6   localization unit, said adaptive beamforming unit, and said

03:27:42   7   noise reduction unit are integrated into a digital signal

03:27:46   8   processor.

03:27:47   9   Do you see that?

03:27:54   10   MR. HADDEN: I'm sorry, can we get the next chunk,

03:27:57   11   Mr. Berk, so that we match? It says wherein -- I'm sorry.

03:28:05   12   The attachment is right, Mr. Berk. It was just the patent

03:28:08   13   was wrong.

03:28:08   14   THE COURT: Just a minute, Dr. Zhu.

03:28:10   15   THE WITNESS: Yes.

03:28:11   16   THE COURT: Once he gets it highlighted the way he

03:28:14   17   wants, I'll ask him to restate his question.

03:28:17   18   MR. HADDEN: Thank you, Your Honor. Sorry for the

03:28:21   19   delay.

03:28:26   20   A. Again, as I said --

03:28:27   21   THE COURT: Let -- let him reask the question,

03:28:30   22   please.

03:28:30   23   MR. HADDEN: Will you highlight the wherein

03:28:32   24   clause, please, Mr. Berk, on the right-hand side? Thank

03:28:50   25   you, Mr. Berk.

03:28:50 1 Q. (By Mr. Hadden) So now looking at the claim, and I'm

03:28:53 2 sorry for the delay, Dr. Zhu, Claim 1 of the '049 patent

03:28:56 3 has the language: Wherein said sound source localization

03:29:02 4 unit, said adaptive beamforming unit, and said noise

03:29:06 5 reduction unit are in operative communication with said

03:29:12 6 array of sound sensors.

03:29:14 7   Do you see that?

03:29:14 8 A. Yeah, I saw that.

03:29:16 9 Q. Okay. And if we go back to the attachment to this one

03:29:19 10 declaration, it says: It is wrong to recite that the sound

03:29:29 11 source localization unit, the adaptive beamforming unit,

03:29:31 12 and the noise reduction unit are in operative communication

03:29:33 13 with the array of sound sensors.

03:29:36 14   Do you see that, Dr. Zhu?

03:29:37 15 A. I saw that.

03:29:38 16 Q. And you agree with me, Dr. Zhu, that is the same

03:29:41 17 language that is in the '049, Claim 1? Isn't that right,

03:29:46 18 Dr. Zhu?

03:29:47 19 A. My understanding about this issue is we want to broaden

03:29:53 20 our original patent, '756, and it's wrong --

03:29:58 21   THE COURT: Dr. Zhu.

03:30:00 22   THE WITNESS: Yeah.

03:30:00 23   THE COURT: He asked you if it was the same

03:30:02 24 language. He didn't ask you for your understanding of what

03:30:05 25 you were trying to accomplish. Mr. Baxter will have a

03:30:08   1   chance to go through that with you again, if he chooses to.

03:30:13   2   But you need to limit your answer to the question asked.

03:30:17   3   THE WITNESS: Okay.

03:30:17   4   THE COURT: Is that the same language on both

03:30:19   5   sides of the screen?

03:30:20   6   THE WITNESS: It is.

03:30:23   7   Q. (By Mr. Hadden) Thank you. No further questions.

03:30:25   8   THE COURT: You pass the witness, counsel?

03:30:27   9   MR. HADDEN: I do.

03:30:28 10   THE COURT: Is there redirect?

03:30:30 11   MR. BAXTER: Oh, yes, Your Honor.

03:30:30 12   THE COURT: Let's proceed with redirect.

03:30:32 13   MR. BAXTER: Thank you.

03:30:32 14   REDIRECT EXAMINATION

03:30:41 15   BY MR. BAXTER:

03:30:41 16   Q. Let's start right there, Dr. Zhu.

03:30:44 17   First of all, do any of the papers in Exhibit 1468

03:30:49 18   where he's got the box checked "by reason of errors" and

03:30:54 19   has this attached sheet, does it have anything to do with

03:30:57 20   the patent in this case, the '049.

03:30:59 21   A. The reissue is for -- based on the '756.

03:31:06 22   Q. So this reissue was for a patent called the '756, which

03:31:10 23   is not in this case; is that right?

03:31:11 24   A. Yes.

03:31:16 25   Q. Okay.

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03:31:17   1   A.   Yeah.

03:31:17   2   Q.   This case is about the '049?

03:31:19   3   A.   Yeah, it is.

03:31:20   4   Q.   And none of these documents are about the '049, are

03:31:22   5   they?

03:31:22   6   A.   Yes, this is a reissue.  Yeah, it's not.  It's for

03:31:26   7   '756.

03:31:26   8   Q.   Nothing to do with the patent in this case?

03:31:28   9   A.   Yes.

03:31:29  10   Q.   All right.  Now, counsel wanted to start and did start

03:31:35  11   in the middle, and you asked him if you could start at the

03:31:40  12   beginning?

03:31:40  13        MR. BAXTER:  Can we have that up on the attached

03:31:45  14   sheet, Mr. Thompson?  There you go.  No, no.  There we go.

03:31:54  15   Q.   (By Mr. Baxter)  Can you read -- can you read the whole

03:31:56  16   sentence and explain to the jury what the whole sentence

03:31:59  17   means instead of half of it?

03:32:02  18   A.   Yes.  Since the sound source localization unit, said

03:32:07  19   adaptive beamforming unit, and said noise reduction unit

03:32:11  20   are already integrated into the digital signal processor,

03:32:17  21   it is wrong to cite that the sound source localization

03:32:22  22   unit, adaptive beamforming unit, and noise reduction unit

03:32:25  23   are in operative communications with array of sound

03:32:30  24   sensors.  Instead, the correct recitation is that the

03:32:34  25   digital signal processor -- processor is in operative
```

03:32:40 1 communication with array of sound sensors.

03:32:43 2   So --

03:32:43 3 Q. Did you -- I'm sorry, finish it up.

03:32:46 4 A. Yeah. So my understanding about the reissue is we have

03:32:51 5 our first original -- original '756. There was some

03:32:57 6 limitations on that. We were entitled to broaden it. And

03:33:01 7 we filed our first reissue to broaden it, but that's the

03:33:09 8 patent called '049.

03:33:11 9   And -- but in that reissue, we didn't address this

03:33:16 10 limitation. So we filed another reissue to address this

03:33:22 11 limitation. But it's wrong. We mean we limit our claim to

03:33:32 12 this original claim, that's wrong. We should have

03:33:39 13 broadened it. So that's my understanding about the

03:33:41 14 process, yeah.

03:33:41 15 Q. So you went back for a reissue, but you wanted a bigger

03:33:45 16 patent, not a smaller patent; is that right?

03:33:47 17 A. Can you repeat your question?

03:33:49 18 Q. Yes. When you went back for the -- for the reissue,

03:33:52 19 you went for bigger language, a bigger claim instead of a

03:33:56 20 smaller claim?

03:33:56 21 A. Yes.

03:33:57 22 Q. Okay.

03:33:57 23 A. We were entitled to do that.

03:33:59 24 Q. All right. Did you ever say that the '049 patent was

03:34:05 25 inoperable?

03:34:07	1	A. No.
03:34:08	2	Q. Did you ever say the '049 is invalid?
03:34:12	3	A. No.
03:34:13	4	Q. Did you say anything in this paper about the patent in
03:34:18	5	this case, the '049?
03:34:21	6	A. No.
03:34:22	7	Q. Okay. Did you go back to the Patent Office, not to say
03:34:28	8	that your patent wasn't good, but to say I'm entitled to
03:34:32	9	something even better?
03:34:33	10	A. Yes.
03:34:34	11	Q. Is that what you did?
03:34:35	12	A. Yes.
03:34:36	13	Q. And if you read the whole sentence, you can figure out
03:34:41	14	what you're saying and not just read half of it?
03:34:44	15	A. Yes.
03:34:45	16	Q. Okay. Now, I want to talk to you about the patent just
03:34:50	17	a moment, please, if I can, Dr. Zhu.
03:34:55	18	MR. BAXTER: And if we can get up the -- the
03:34:57	19	patent. And I want to go to Figure 3. And -- and put up
03:35:11	20	beside it Figure 4, if you would, please.
03:35:15	21	Q. (By Mr. Baxter) Despite how they look, is that
03:35:26	22	basically the same figure, Doctor?
03:35:28	23	A. Those two are different figures.
03:35:31	24	Q. Okay. Do they depict the same thing?
03:35:34	25	A. No.

03:35:36   1   Q.   Okay.   Is Figure 3 -- would that -- and this all had to

03:35:43   2   do with your 2009 article.   Let's get the stage set, okay?

03:35:47   3   A.   Okay.

03:35:48   4   Q.   Would Figure 3 have ever, ever appeared in the 2009

03:35:53   5   article with the microphones in that array condition?

03:35:57   6   A.   No.   '09 paper is a linear array.

03:36:02   7   Q.   Did you ever have a circular array, like in Figure 3,

03:36:08   8   in the 2009 paper?

03:36:11   9   A.   No.

03:36:11   10   Q.   Okay.   If you can look at Figure 5, could that

03:36:24   11   configuration ever have existed in the 2009 paper?

03:36:28   12   A.   No.

03:36:31   13   Q.   Is that one of the embodiments of the patent, the '049?

03:36:36   14   A.   No.

03:36:37   15   Q.   Okay.   Can you tell the jury what an embodiment --

03:36:42   16   embodiment is, Doctor?

03:36:43   17   A.   Embodiment for this figure?

03:36:45   18   Q.   Well, for any figure.

03:36:46   19   A.   This embodiment shows a microphone array output in a

03:36:52   20   linear shape.

03:36:56   21   Q.   All right.   Figure 4 or Figure 5?

03:36:58   22   A.   Figure 4 -- Figure 5.

03:37:00   23   Q.   Okay.

03:37:00   24   A.   Oh, yeah, Figure 5.

03:37:04   25   MR. BAXTER: I want to turn, if I can, to

03:37:06   1   Column 7, Line 33, where it says Figure 4 right down here.

03:37:18   2   That's it.

03:37:19   3   Q.   (By Mr. Baxter)   This is the explanation in the patent,

03:37:22   4   Doctor, about what Figure 4 is.

03:37:26   5   And it says: Figure 4 exemplarily illustrates a

03:37:30   6   graphical representation of the filter-and-sum beamforming

03:37:35   7   algorithm for determining the output of the microphone

03:37:39   8   array 2001 [sic] having N sound sensors 301.   Consider an

03:37:45   9   example where the target sound signal from the target sound

03:37:47   10   source is at an angle theta with a normalized frequency w.

03:37:51   11   The microphone array configuration is arbitrary in a

03:37:56   12   two-dimensional plane, for example, a circular array

03:38:00   13   configured where the sound sensors 301, which is M theta,

03:38:07   14 M_1, M_2, M to the minus 1 of the microphone array are

03:38:17   15   arbitrarily positioned on a circle.

03:38:20   16   Does Figure 4 contemplate it is all linear, or it

03:38:23   17   was going to be in a circle?

03:38:25   18   A.   Figure 4 gives example on the circle.

03:38:27   19   Q.   Okay.   Even though it looks linear, it's really an

03:38:31   20   example of a circle?

03:38:34   21   A.   It can be any configuration.

03:38:37   22   Q.   Okay.

03:38:38   23   A.   Yeah.

03:38:38   24   Q.   Would that figure have ever been in your 2009 paper?

03:38:42   25   A.   Can you repeat your question?

03:38:50   1   Q.   Yes, ma'am.   Would that figure have ever been an

03:38:53   2   illustration of what you were trying to do in the 2009

03:38:55   3   paper?

03:38:56   4   A.   No.

03:38:56   5   Q.   Okay.   Remind the jury once again what the 2009 paper

03:39:02   6   was all about.

03:39:03   7   A.   The 2009 paper is about linear array technology, yeah.

03:39:08   8   Q.   And it needed the voice in front of it or behind it or

03:39:12   9   where?

03:39:13 10   A.   Yeah, we need the voice coming from in front of the

03:39:16 11   microphone.

03:39:16 12   Q.   And if I were standing over here and if it was facing

03:39:20 13   towards you, it wouldn't work very well?

03:39:22 14   A.   No.

03:39:23 15   Q.   Okay.

03:39:23 16   MR. BAXTER: Now, I want to look at the patent and

03:39:27 17   Claim 1.   We can look at Column 21.   It says Claim 1.   If

03:39:39 18   you can go down to where it says: Receiving said sound

03:39:46 19   signal.

03:39:46 20   Q.   (By Mr. Baxter)   Now, I believe there was a discussion

03:39:47 21   with counsel about whether or not the figure -- and this

03:39:54 22   was Figure 5, I think -- had a principal sound source and

03:40:00 23   if he could determine what it was.   And you were trying to

03:40:02 24   explain to him that the patent in -- the microphones pick

03:40:07 25   up everything.   Is that right?

03:40:08   1   A.   Yes.

03:40:08   2   Q.   Okay.   Explain what receiving sound signals from a

03:40:13   3   plurality of disparate sound sources means.

03:40:17   4   A.   That means in the real application, the microphone

03:40:22   5   sensor pick up sound -- microphone sound sensor pick up

03:40:23   6   sound from all direction.

03:40:26   7   Q.   Okay.   The next sentence says "determining."   Now, I

03:40:32   8   think counsel kept using the word "calculate."   Do you

03:40:36   9   remember that?

03:40:36   10 A.   Yes.

03:40:37   11 Q.   Are determining and calculating the same thing?

03:40:39   12 A.   It's similar, but they're not.

03:40:45   13 Q.   Does determining require -- always require

03:40:50   14 calculations?

03:40:51   15 A.   You can formulate in different ways.   Determine, you

03:40:55   16 can formulate in different ways.

03:40:57   17 Q.   Does it require calculations in every instance?

03:41:00   18 A.   Not always.

03:41:07   19 Q.   Okay.   Does the word "calculating" appear in that claim

03:41:13   20 anywhere?

03:41:18   21 A.   No.

03:41:19   22 Q.   It just says "determining"?

03:41:20   23 A.   Yes.

03:41:25   24 Q.   All right.

03:41:26   25   MR. BAXTER: Now, let me look at Figure 19A, if we

03:41:29   1   could, Mr. Thompson.   A few more.   There you go.

03:41:45   2   Q.   (By Mr. Baxter)   19A, 19B, and it goes through 19F.

03:41:51   3   Does that show microphones in an array that are in

03:41:54   4   a circle?

03:41:54   5   A.   Yes, they are all different examples.

03:41:57   6   Q.   These are different embodiments?

03:41:59   7   A.   Yes.

03:41:59   8   Q.   Would these figures -- could they ever have appeared in

03:42:06   9   the 2009 article that you wrote?

03:42:08   10 A.   No.

03:42:09   11 Q.   Did the patent, the '049 patent, did it have anything

03:42:15   12 to do with the 2009 article?

03:42:20   13 A.   They are different.

03:42:21   14 Q.   Okay.   And I think counsel asked you if you looked at

03:42:27   15 somebody else's algorithms as you wrote this patent and

03:42:29   16 developed the product.   Do you remember those questions?

03:42:32   17 A.   Yes, I remember he point me to reference papers.

03:42:36   18 Q.   Did you copy anybody's algorithms to get to your

03:42:39   19 patent?

03:42:39   20 A.   No.

03:42:42   21 Q.   Did you write them all yourself?

03:42:46   22 A.   Yes.

03:42:46   23 Q.   Okay.

03:42:48   24   MR. BAXTER: Could I get over to the desk just a

03:42:51   25 minute, Your Honor?   I forgot to pick up a...

03:42:55 1   THE COURT: Certainly.

03:43:17 2   Q. (By Mr. Baxter) Now, Doctor, do you remember being

03:43:19 3   asked about the Brandstein book -- the textbook, the

03:43:25 4   Brandstein book?

03:43:26 5   A. Yes.

03:43:26 6   Q. Have you looked at the Brandstein book?

03:43:28 7   A. Yes.

03:43:29 8   Q. Okay. Did you use the Brandstein book to develop any

03:43:34 9   of your ideas for the '049 patent?

03:43:38 10 A. No.

03:43:41 11 Q. Okay.

03:43:42 12   MR. BAXTER: Can I see Plaintiff's Exhibit No. 8,

03:43:45 13 please?

03:43:45 14 Q. (By Mr. Baxter) This is the origin of the patents --

03:43:54 15 this is a provisional patent with a date of September 24th,

03:43:58 16 2010. Do you see that?

03:43:59 17 A. Yes.

03:43:59 18 Q. And do you know what a provisional patent is, Doctor?

03:44:02 19 A. Yes.

03:44:02 20 Q. All right. Tell the jury what it is.

03:44:04 21 A. This is the date we filed our provisional, yeah.

03:44:08 22 Q. Okay.

03:44:09 23   MR. BAXTER: If I can look at Page 23.

03:44:12 24 Q. (By Mr. Baxter) And is this the origin of the '049

03:44:15 25 patent originally?

03:44:16	1	A. Say that again, please.
03:44:19	2	Q. Is this the start of the chain of patents that ended up
03:44:22	3	in the '049 --
03:44:23	4	A. Yes.
03:44:25	5	Q. -- this provisional patent?
03:44:27	6	A. Yes, yes, yes.
03:44:29	7	MR. BAXTER: Can I -- can --
03:44:31	8	Q. (By Mr. Baxter) And -- and you sent this to the Patent
03:44:34	9	Office, right?
03:44:34	10	A. Yes.
03:44:35	11	Q. Okay.
03:44:37	12	MR. BAXTER: Can I have you blow up where it says
03:44:39	13	"references"?
03:44:42	14	Q. (By Mr. Baxter) And it's -- the second one, says:
03:44:43	15	Brandstein and Ward, Microphone Arrays, Springer, 2001. Is
03:44:52	16	that the textbook that counsel was asking you about?
03:44:54	17	A. Yes.
03:44:55	18	Q. And did you reveal this to the Patent Office? In the
03:44:57	19	very first paper you sent them, you said: Hey, we used
03:45:03	20	this reference. You might want to take a look at it.
03:45:06	21	A. Okay.
03:45:06	22	Q. And did they do that?
03:45:06	23	A. I did.
03:45:06	24	Q. And did they issue -- and did they issue the patent?
03:45:08	25	A. Yes.

03:45:09   1   Q.   Even though they knew about the Brandstein reference?

03:45:14   2   A.   Yes, I only remember I give all the relevant

03:45:16   3   information to patent agent.   Yeah, I --

03:45:19   4   Q.   And apparently he notified the Patent Office about it?

03:45:22   5   A.   Yeah.

03:45:23   6   MR. BAXTER: Okay.   Thank you.   Your Honor, that's

03:45:27   7   all I have.

03:45:28   8   THE COURT: All right.   You pass the witness,

03:45:30   9   Mr. Baxter?

03:45:31   10   MR. BAXTER: Yes.

03:45:31   11   THE COURT: Is there additional cross, Mr. Hadden?

03:45:33   12   MR. HADDEN: Just very briefly, Your Honor.

03:45:38   13   THE COURT: Proceed with your additional

03:45:40   14   cross-examination.

03:45:41   15   MR. HADDEN: Thank you, Your Honor.

03:45:41   16   RECROSS-EXAMINATION

03:45:41   17   BY MR. HADDEN:

03:45:41   18   Q.   Dr. Zhu, your counsel just showed you that provisional

03:45:47   19   application.   Do you recall that?

03:45:49   20   A.   Say that again, please.

03:45:50   21   Q.   Your counsel just showed you a provisional patent

03:45:53   22   application?

03:45:54   23   A.   Yes.

03:45:55   24   Q.   Do you recall that?

03:45:56   25   A.   Yes.

03:45:56   1   Q.   And you understand that provisional patent applications

03:46:00   2   are not examined by examiners; do you understand that,

03:46:03   3   right?

03:46:03   4   A.   I don't understand that.

03:46:04   5   Q.   Okay.

03:46:06   6   MR. HADDEN: Can we bring up DTX-980A and go to

03:46:11   7   the attached sheet, Mr. Berk?

03:46:15   8   Q.   (By Mr. Hadden)   Now, you understand, Dr. Zhu, that the

03:46:19   9   '049 was the first reissue for the '756 patent?

03:46:24   10   A.   Yes.

03:46:25   11   Q.   Okay.   And if we look at this attachment to the

03:46:30   12   declaration that you filed and if we look at the line

03:46:35   13   beginning: This error was not corrected.

03:46:39   14   MR. HADDEN: Do you see that, Mr. Berk?   Thank

03:46:41   15   you.

03:46:41   16   Q.   (By Mr. Hadden)   This error was not corrected in the

03:46:43   17   first reissued patent.   Do you see that?

03:46:45   18   A.   Yes.

03:46:45   19   Q.   So you were telling the Patent Office that the error

03:46:49   20   you were identifying here had not been corrected in the

03:46:52   21   '049 patent; isn't that correct?

03:46:52   22   A.   I just said this error means this limitation was not

03:46:59   23   corrected in the first reissue.   So by error, I mean this

03:47:05   24   limitation was not corrected.   That was the error.

03:47:11   25   MR. HADDEN: Move to strike, non-responsive,

03:47:14   1   Your Honor.

03:47:14   2   THE COURT: Overruled.

03:47:18   3   Q. (By Mr. Hadden) Now, if you look at --

03:47:27   4   MR. HADDEN: Can we go to Page 2 of 2 of this

03:47:30   5   document, Mr. Berk, with Dr. Zhu's signature?

03:47:32   6   Q. (By Mr. Hadden) Is that your signature, Dr. Zhu?

03:47:38   7   A. Yes.

03:47:41   8   Q. And you signed this in July 22nd of this year; is that

03:47:45   9   correct?

03:47:45 10   A. Yes.

03:47:47 11   Q. Okay. And when you signed that, did you understand

03:47:51 12   that when you said that the patent was inoperable or

03:47:57 13   invalid, you're signing that under oath?

03:47:59 14   A. I saw that's the routine paper. I don't want to argue

03:48:03 15   that. Yeah.

03:48:05 16   Q. Did you understand that you're signing this under oath

03:48:09 17   when you signed it in July of 2020?

03:48:12 18   A. Yeah, I understand that. Yeah.

03:48:14 19   Q. Thank you.

03:48:15 20   MR. HADDEN: No further questions.

03:48:16 21   THE COURT: Any additional direct?

03:48:18 22   MR. BAXTER: Yes, Your Honor.

03:48:18 23   REDIRECT EXAMINATION

03:48:19 24   BY MR. BAXTER:

03:48:19 25   Q. So, Dr. Zhu, the paper you signed, did it have anything

03:48:33   1   to do with the patent in this case?

03:48:36   2   A.   No.

03:48:36   3   Q.   No?

03:48:39   4   MR. BAXTER: That's all I have, Your Honor.

03:48:40   5   THE COURT: Additional cross?

03:48:41   6   MR. HADDEN: No, Your Honor.

03:48:42   7   THE COURT: All right.   Dr. Zhu, you may step

03:48:45   8   down.

03:48:45   9   MR. BAXTER: Can she be excused, Your Honor,

03:48:47 10   and --

03:48:48 11   THE COURT: Any objection?

03:48:49 12   MR. HADDEN: No, Your Honor.

03:48:49 13   THE COURT: All right.   The witness is excused.

03:48:52 14   You're free to stay; you're free to leave.

03:48:55 15   MR. BAXTER: Thank you, Your Honor.

03:48:56 16   THE WITNESS: Thank you, Judge.

03:49:10 17   THE COURT: Plaintiff, call your next witness.

03:49:12 18   MR. FABRICANT: Yes, Your Honor.

03:49:13 19   MR. LAMBRIANAKOS: Your Honor, Plaintiff calls by

03:49:23 20   deposition Chiawei "Jerry" Wu, former advanced sourcing

03:49:28 21   commodity manager at Amazon's Lab126.

03:49:32 22   Playing time for Plaintiff is 29 minutes, 8

03:49:34 23   seconds and for Defendants, 41 seconds.

03:49:36 24   THE COURT: Proceed with this witness by

03:49:38 25   deposition.

03:49:38	1	MR. LAMBRIANAKOS: Thank you.
03:49:38	2	CHIAWEI "JERRY" WU, PLAINTIFF'S WITNESS
03:49:40	3	PRESENTED BY VIDEO DEPOSITION
03:49:40	4	(Videoclip played.)
03:49:44	5	Q. Okay. Mr. Wu, can you please state your name for the
03:49:52	6	record?
03:49:52	7	A. Sure. My name is Jerry Wu. My official name is
03:49:55	8	Chiawei, C-h-i-a-w-e-i, but I go by Jerry at work.
03:50:01	9	Q. At some time had you worked for a company called
03:50:04	10	Lab126?
03:50:04	11	A. Yes, I did. From 2010 to 2012.
03:50:08	12	Q. So when you were working at Amazon between 2010 and
03:50:12	13	2012, what was your job title?
03:50:13	14	A. Advanced sourcing commodity manager. Advanced sourcing
03:50:17	15	commodity manager.
03:50:18	16	Q. So it was technology sourcing; you were looking for
03:50:21	17	technologies, right?
03:50:22	18	A. That's correct. But some time -- I would say probably
03:50:27	19	about 70 percent time that I came from engineering and say,
03:50:27	20	hey, this product not be good. We might want to talk to
03:50:27	21	them. And 38 percent something -- you know, something I've
03:50:36	22	done before, and I can help in finding the suppliers.
03:50:36	23	Q. But the technology sourcing you worked on, ultimately
03:50:40	24	evolved into the Echo project and the Echo product at
03:50:43	25	Amazon, correct?

03:50:44   1   A. Some of them, yes. But you have to be more specific

03:50:51   2   exactly what that is. I don't understand that question

03:50:54   3   very well.

03:50:54   4   Q. How many vendors did you meet with, when you were

03:51:00   5   working at Amazon?

03:51:01   6   ATTORNEY: Objection.

03:51:02   7   A. Probably at least several hundred.

03:51:05   8   Q. So to ask you a slightly broader question. How many

03:51:12   9   technology vendors did you initiate a dialog with, start

03:51:16   10   talking to?

03:51:16   11   A. I don't recall, but it's going to be up in the

03:51:21   12   hundreds.

03:51:21   13   Q. So, you know, to put that another way, it's fair to say

03:51:24   14   that, you know, one in four or one in five of the companies

03:51:31   15   that you saw at a trade show or received a solicitation

03:51:35   16   from proceeded to the NDA phase, right?

03:51:38   17   A. Correct.

03:51:39   18   ATTORNEY: Objection.

03:51:40   19   Q. And at least -- there was at least some indication from

03:51:43   20   Amazon's perspective that when you went to the NDA phase,

03:51:47   21   there was some initial interest in that company, right?

03:51:49   22   A. Yes.

03:51:50   23   Q. Now, during that process, do you recall any of those

03:51:56   24   potential vendors telling you that they had patents

03:52:00   25   protecting their products that they were looking to sell to

03:52:04   1   Amazon?

03:52:05   2   A.   No.   Because in a sales presentation will only tell you

03:52:16   3   how that thing fits in that topic for you, how we can use

03:52:20   4   that up -- that use cases.   But no mention of patents.

03:52:23   5   Q.   No mention of any type of intellectual property, right?

03:52:27   6   A.   No.

03:52:33   7   Q.   If that would have been a presentation, you would have

03:52:36   8   remembered it, right?

03:52:37   9   A.   Correct.   Because it's such an abnormal behavior,

03:52:40   10 because I have never -- I've been doing this almost, what,

03:52:43   11 since 90 -- since 2000.   So a 20-year career.   I don't see

03:52:48   12 any patents usually mentioned in sales or technical

03:52:51   13 reviews.

03:52:53   14 Q.   They don't tell you about their patents, they don't

03:52:56   15 tell you about their patent applications?   That would have

03:52:59   16 been something different from the norm for you if a

03:53:01   17 technology vendor had told you about patents, applications,

03:53:05   18 or intellectual property covering their products, right?

03:53:08   19 A.   Correct.   Because that's very abnormal.   I haven't seen

03:53:12   20 it in my career.

03:53:16   21 Q.   Now, do you have any visibility into whether -- into

03:53:29   22 whether Amazon would investigate or would have investigated

03:53:34   23 intellectual property, after you got to that in-person

03:53:38   24 meeting phase?

03:53:39   25 A.   So from our side, only when we -- when the supplier

03:53:45 1 gets selected, we'll do our due diligence in terms of

03:53:49 2 contract identification. I don't believe they're actually

03:53:52 3 looking into IP database for everything. We just say that

03:53:56 4 we do -- if we do use the product, we don't get sued by it.

03:54:00 5 That's the normal process.

03:54:05 6 Q. So just to go over again what you described as the

03:54:14 7 process, when you receive the technology presentations from

03:54:18 8 tech vendors, you would pass those on to technology people

03:54:22 9 within Amazon, right? That's a normal part of the

03:54:24 10 in-person meeting process, right? Hello?

03:54:28 11 A. So we are copied on it. Hello? Can you hear -- I'm

03:54:42 12 sorry, my Internet connection is a little bit slow.

03:54:44 13   So, typically, how it works, after the in-person

03:54:48 14 meeting, the presentation file, if the supplier wants to

03:54:51 15 provide, it is sent to everybody on the email chain on the

03:54:55 16 meetings. It doesn't necessarily go through me.

03:55:01 17 Q. And just to confirm, you said that if -- if that

03:55:07 18 presentation mentioned patents, that would have been an

03:55:09 19 aberration from the norm? That would have been something

03:55:12 20 you don't recall seeing in your 20-year career, right?

03:55:16 21 A. Correct. That's very, very abnormal. I haven't seen

03:55:19 22 it.

03:55:20 23 Q. Big red flag, big abnormal thing, right?

03:55:24 24 A. Right.

03:55:24 25 Q. Do you recall attending a trade show called CES in

03:55:28 1 2011?

03:55:28 2 A. Yes.

03:55:28 3 Q. Did you often attend the CES trade show?

03:55:36 4 A. Yes. Part of my job requirement.

03:55:39 5 Q. What does CES stand for?

03:55:44 6 A. Consumer Electronic Show.

03:55:48 7 Q. And is that one of the places you would go to, to find

03:55:54 8 potential vendors, potential new vendors?

03:55:56 9 A. Correct.

03:55:57 10 Q. Were you looking for, among other things, vendors who

03:56:02 11 had won awards at those trade shows?

03:56:04 12 A. Yes.

03:56:09 13 Q. And you would have attended CES in 2010, as well,

03:56:14 14 right?

03:56:14 15 A. Correct.

03:56:14 16 Q. And 2012?

03:56:15 17 A. Yes, I did.

03:56:16 18 Q. So you met with the big companies in that scenario,

03:56:22 19 right? You had meetings with the big companies?

03:56:24 20 A. Correct.

03:56:25 21 Q. And you would have let your -- your engineer walk the

03:56:33 22 floor and look for maybe some smaller companies with good

03:56:37 23 technology, right?

03:56:38 24 A. Correct. That's typically what CES was for.

03:56:44 25 Q. Then you would follow up with those companies whose

03:56:47 1 technology you were interested in and try to arrange some

03:56:51 2 NDAs and in-person meetings, right?

03:56:54 3 A. Correct.

03:56:55 4 Q. So what I'm asking you about is a little more -- more

03:56:58 5 specific, which is, do you remember any of the smaller

03:57:01 6 suppliers that you would have met with or been referred to

03:57:05 7 from the CES trade show while at Amazon?

03:57:08 8 A. The answer is probably no. If it's not a big company,

03:57:14 9 I don't remember it.

03:57:15 10 Q. And you would have remembered if a smaller company had

03:57:29 11 come to you and told you that you needed their patents to

03:57:32 12 work in this space, right?

03:57:34 13 A. I would -- I would have remembered if that would be the

03:57:37 14 case.

03:57:37 15 Q. Because that would be a big, red flag to you, right?

03:57:43 16   ATTORNEY: Objection, form.

03:57:45 17 A. Correct.

03:57:46 18 Q. And do you see an email, Exhibit 2?

03:57:49 19 A. Yeah, yeah.

03:57:50 20 Q. Do you see the "from" line says Jerry Wu?

03:57:53 21 A. Yes.

03:57:54 22 Q. So you wanted -- you contacted Li Creative Technologies

03:57:57 23 and asked for a demo of their adaptive beamforming, 3D

03:58:01 24 audio, noise and echo cancellation technologies, correct?

03:58:05 25 A. Correct. That's what engineering probably asked me to

03:58:11	1	do, yes.
03:58:12	2	Q. And you wanted to have a meeting and a demo, correct?
03:58:17	3	A. If possible, yes. That's our request.
03:58:20	4	Q. So did you put those requirements in here, or did
03:58:28	5	someone else tell you that's what Lab126 is interested in
03:58:31	6	seeing?
03:58:32	7	A. Engineering does.
03:58:33	8	Q. So, to your knowledge, engineering said to you they're
03:58:37	9	interested in seeing adaptive beamforming on input, 3D
03:58:41	10	audio, noise echo cancellation, and other from Li Creative
03:58:45	11	Technologies? That would have been given to you from
03:58:47	12	engineering, right?
03:58:48	13	A. Correct.
03:58:48	14	Q. So if it wasn't you that knew Li Creative Technology
03:58:59	15	may have these technologies, it must have come from
03:59:02	16	engineering. Someone in engineering must have known that
03:59:06	17	Li Creative Technologies may have these interesting
03:59:09	18	technologies, adaptive beamforming and noise and echo
03:59:13	19	cancellation, correct?
03:59:14	20	ATTORNEY: Objection, form.
03:59:17	21	A. Correct.
03:59:17	22	Q. Now, I want to ask you a little bit about the Fire
03:59:22	23	Phone. You're familiar with that product that was
03:59:26	24	ultimately released by Amazon, right?
03:59:27	25	A. Correct.

03:59:27   1   Q.   That product was an utter failure for Amazon, wasn't

03:59:31   2   it?

03:59:31   3   A.   Yes. It was a failure, yes.

03:59:33   4   Q.   So you invited Dr. Li and Li Creative Technologies to

03:59:36   5   come to Amazon's secret facility to give a demo about Li

03:59:40   6   Creative Technologies' audio-processing technologies,

03:59:42   7   correct?

03:59:42   8   A.   Correct.

03:59:45   9   Q.   Well, it's what you wanted them to demonstrate, right?

03:59:49   10   You asked for this demonstration, didn't you?

03:59:51   11   A.   Yes. By request of engineering, yes.

03:59:54   12   Q.   So the engineers want Li Creative Technology to come

03:59:59   13   into Amazon's secret facility and demonstrate Li Creative

04:00:04   14   Technologies' technology at this meeting, correct?

04:00:06   15   A.   Correct.

04:00:06   16   Q.   So, first, I'd like to ask you: Did this confirm

04:00:13   17   that -- your understanding that the meeting between Li

04:00:18   18   Creative Technologies with Dr. Li and Amazon took place?

04:00:20   19   A.   Yes, I confirm.

04:00:27   20   Q.   So that meeting took place on October 17th, 2011,

04:00:33   21   right?

04:00:33   22   A.   It looks like it, yes.

04:00:35   23   Q.   And Dr. Li gave a presentation at that meeting, right?

04:00:42   24   A.   I guess so, from the email. No one object to it, yes.

04:00:46   25   Q.   And Dr. Li forwarded you the presentation file after

04:00:53   1   the meeting, right?

04:00:55   2   A.   He didn't send it to me.   He sent it to everybody,

04:00:59   3   right.   That email said very clear, sent to everyone.

04:01:02   4   Q.   You were included on the email, correct?

04:01:04   5   A.   Correct, I was included on the email.

04:01:06   6   Q.   So you would have received a copy of this presentation,

04:01:09   7   right?

04:01:09   8   A.   Yes.

04:01:11   9   Q.   And Aleksandar Pance would have received a copy of the

04:01:13   10   presentation, right?

04:01:14   11   A.   Correct.   Because he's on the email on the attachment.

04:01:19   12   Q.   And Matt Holland would have received a copy of the

04:01:23   13   presentation, right?

04:01:24   14   ATTORNEY: Objection, form.

04:01:26   15   A.   Yes.

04:01:27   16   Q.   And Sergei would have received a present -- a copy of

04:01:27   17   the presentation, right?

04:01:27   18   ATTORNEY: Objection to form.

04:01:27   19   A.   Yeah.

04:01:27   20   Q.   And you see it's addressed to Aleks, Matt, David,

04:01:32   21   Sergei, and colleagues.   You see colleagues in there,

04:01:35   22   right?

04:01:35   23   A.   Correct.

04:01:36   24   Q.   So do you know one way or the other whether other

04:01:41   25   people would have attended that meeting?

04:01:44	1	A. Probably.
04:01:45	2	ATTORNEY: Objection, form.
04:01:47	3	Q. Probably what?
04:01:48	4	A. The answer is yes. There were probably additional
04:01:53	5	personnel there.
04:01:54	6	Q. Do you know how many people attended the meeting?
04:01:56	7	A. I wouldn't know. I wasn't there. I -- I believe I was
04:01:59	8	traveling.
04:01:59	9	Q. Based on your understanding of how these meetings would
04:02:03	10	happen at Amazon, do you have any understanding as to
04:02:05	11	generally how many people would attend a meeting like this?
04:02:08	12	A. Probably, at most, seven to eight people, tops.
04:02:16	13	Q. So if it were, you know, a more significant meeting,
04:02:21	14	perhaps you'd have more people attending, right?
04:02:23	15	A. Correct.
04:02:24	16	Q. And Li Creative Technologies presented on spontaneous
04:02:30	17	speech conversion, far-field speech with microphone array,
04:02:33	18	real-time online system response for both ASR and speaker
04:02:37	19	ID. You see that?
04:02:39	20	ATTORNEY: Objection, form.
04:02:40	21	A. I see that, yes.
04:02:42	22	Q. And a real-time online system response for both ASR and
04:02:50	23	speaker ID, do you know what that means?
04:02:55	24	A. I know what speaker ID is, yes. But beyond that, I
04:03:03	25	don't know what you're talking. But I think that's more --

04:03:07   1   acting -- acting -- some kind of -- you know, reduction.   I

04:03:11   2   have no idea what it is.

04:03:13   3   Q.   But you know what speaker ID is, right?

04:03:18   4   A.   Yeah.

04:03:18   5   Q.   That wasn't used in the Fire Phone, was it?

04:03:22   6   A.   No, I don't believe so.

04:03:24   7   Q.   The Fire Phone didn't have an online system for speaker

04:03:31   8   ID, right?

04:03:31   9   A.   I don't believe so.   I -- I don't know the detail.

04:03:34 10   Q.   So, to your understanding, the Fire product you were

04:03:41 11   working on in the 2011 time frame didn't do online response

04:03:44 12   or speaker identification, right?

04:03:48 13   A.   It wasn't a for-use case.

04:03:51 14   Q.   Do you see the second to the last bullet point saying

04:03:55 15   audio search?

04:03:56 16   A.   Yes.

04:03:56 17   Q.   You see it says voice search and music search?

04:04:02 18   A.   Yes.

04:04:02 19   Q.   Now, those weren't features of the Fire Phone, were

04:04:07 20   they?

04:04:07 21   A.   This is what the salesperson trying to sell yourself.

04:04:10 22   Try to come up with use case.

04:04:11 23   Q.   I'm just asking you about Amazon's products that you're

04:04:15 24   aware of.   Voice search and music search were not functions

04:04:19 25   of the Fire Phone project, correct?

04:04:22   1   ATTORNEY: Objection.

04:04:23   2   A.   Correct.

04:04:24   3   Q.   But the Echo products that you know of from having seen

04:04:28   4   them, those have voice search and music search online,

04:04:33   5   correct?

04:04:33   6   A.   Yes.

04:04:33   7   Q.   But you reached out to Li Creative.   They didn't --

04:04:38   8   they didn't email you.   You saw the email.   You reached out

04:04:40   9   to Li Creative, right?

04:04:42   10 A.   Correct.

04:04:42   11 Q.   And you did that because engineers at Amazon told you

04:04:44   12 to do it, right?

04:04:46   13 A.   Correct.

04:04:46   14 Q.   And so you're testifying now that the reason they

04:04:49   15 wanted you to contact Li Creative Technologies wouldn't

04:04:52   16 have just been just because of this award in 2011, it would

04:04:57   17 have been some other reason they wanted you to contact Li

04:05:02   18 Creative Technologies, right?

04:05:02   19 A.   It's more timing.   No reason.

04:05:06   20 Q.   I'm not asking you about timing.   I'm asking you about

04:05:09   21 the reason, why you reached out to Li Creative

04:05:11   22 Technologies.   I mean, it's your testimony that it would

04:05:15   23 not have been because of or just because of this award in

04:05:18   24 2011.   It would have been some other reason why you were

04:05:21   25 instructed to contact Li Creative Technologies, correct?

04:05:24	1	A. Correct.
04:05:28	2	Q. Did you think that may have been because someone was
04:05:31	3	doing Internet searching or looking into these types of
04:05:34	4	companies and found something that they wanted to follow up
04:05:37	5	on, right?
04:05:39	6	ATTORNEY: Objection to form.
04:05:40	7	A. Yes.
04:05:42	8	Q. And if you take a look at this page, you also see it
04:05:47	9	says a circular microphone array, right? That's -- that's
04:05:50	10	what Li Creative Technologies is presenting here, isn't it?
04:05:53	11	A. Yes.
04:05:53	12	Q. So, to your knowledge, did the Fire Phone have a
04:05:57	13	circular microphone array?
04:05:58	14	A. No. It won't fit.
04:06:00	15	Q. So, to your knowledge, did any Amazon product at that
04:06:04	16	time have a circular microphone array?
04:06:06	17	A. Nope.
04:06:08	18	Q. Back in 2012, right, you didn't have a circular
04:06:11	19	microphone array? At 2011 time frame when Dr. Li presented
04:06:15	20	the option of having a circular microphone array, right?
04:06:19	21	A. That's right, yes.
04:06:20	22	Q. So just to confirm, prior to Dr. Li's presentation,
04:06:29	23	it's your testimony that Amazon didn't have any product,
04:06:33	24	anything in development that you're aware of, with a
04:06:37	25	circular microphone array, correct?

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04:06:38   1   A.   That's correct.
04:06:53   2   Q.   Would you take a look at the page immediately preceding
04:06:58   3   this, Bates 16213?  Do see where it says sound source
04:07:04   4   localization?
04:07:04   5   A.   Yes.
04:07:08   6   Q.   And it's also your understanding that none of Amazon's
04:07:11   7   products in the 2011 time frame, prior to this
04:07:14   8   presentation, were doing any kind of sound source
04:07:16   9   localization, right?
04:07:17  10   A.   Correct.
04:07:18  11   Q.   And do you see where it says one of the core
04:07:21  12   technologies is acoustic signal processing?  Do you see
04:07:24  13   that that's what Li Creative Technology is saying?
04:07:27  14   A.   Yes.
04:07:27  15   Q.   And included in their core technologies, they say,
04:07:35  16   among other things, circular microphone array, right?  Do
04:07:44  17   you see that?
04:07:46  18   A.   Yes.
04:07:46  19   Q.   You have noise reduction.  Do you see that?
04:07:50  20   A.   Yes.
04:07:52  21   Q.   Echo cancellation.  Do you see that?
04:07:53  22   A.   I see that, yes.
04:07:54  23   Q.   And you see sound source localization, as well.  Do you
04:07:57  24   see that?
04:07:58  25   A.   Yes.
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04:07:58   1   Q.   It's your understanding that there weren't any Amazon

04:08:05   2   products in 2011 that utilize all of these core

04:08:09   3   technologies, circular microphone array, noise reduction,

04:08:13   4   echo cancellation, and sound source localization, right?

04:08:17   5   A.   Correct.   That's because at that time I was working --

04:08:21   6   called Project V, so I'm not -- I'm not aware of anything

04:08:25   7   else on that.

04:08:25   8   Q.   And above that, do you see where it says patents, 13

04:08:28   9   filed, two issued?   Do you see that?

04:08:30 10   A.   Yes.

04:08:31 11   Q.   And so this is not your standard presentation, right?

04:08:35 12   This is not something that you --

04:08:37 13   A.   I would agree.   So let me clarify that, right?

04:08:43 14   Patents -- it says they have patents.   They didn't give me

04:08:45 15   the details of the patents they have, what they called for.

04:08:49 16   That's not something that is -- something in the

04:08:53 17   short-term, but they had some kind of patent.   That's it.

04:08:55 18   So not in details behind it.

04:08:55 19   Q.   That's your testimony is, it wasn't possible to search

04:08:58 20   for the patents of Li Creative Technologies?   Is that what

04:09:01 21   you're telling me?   That's your testimony?

04:09:02 22   A.   First of all, there's no patent number.   There's no

04:09:05 23   patent claim.   It's not possible for us to do that.

04:09:07 24   Q.   Sir, you know you could go to the USPTO website, type

04:09:12 25   in Li Creative Technologies as the assignee of patents, and

04:09:15   1 you would get the full list of Li Creative Technologies's

04:09:17   2 patents, right, sir? You know that, don't you?

04:09:20   3 A.   That's handled by legal side. I don't do that.

04:09:23   4 Q.   You didn't look? You could have looked, but you did

04:09:26   5 not look, right, sir?

04:09:27   6 A.   No. I don't have access to that.

04:09:32   7 Q.   You didn't go to the USPTO website; is that your

04:09:36   8 testimony?

04:09:36   9 A.   I did not -- I didn't look for it, yes.

04:09:38   10 Q.   You didn't look for it?

04:09:39   11 A.   Yeah. But there's no patent mentioned here.

04:09:43   12 Q.   It says the word "patents." It says the name of the

04:09:47   13 company?

04:09:47   14 A.   Not patent.

04:09:48   15 Q.   And you didn't look for any patents by Li Creative

04:09:51   16 Technologies? That's your testimony, right?

04:09:52   17 A.   Correct.

04:09:53   18 Q.   So you don't look up patents if you're not going to

04:09:56   19 proceed with the supplier, correct?

04:09:57   20 A.   Basically, we had no use for it. We won't follow up.

04:10:04   21 Q.   So that's a yes?

04:10:06   22 A.   That's not what I said. I said there's no use. We

04:10:09   23 would not follow up.

04:10:11   24 Q.   You're not going to look up the patents?

04:10:16   25 A.   Because we're not using it.

04:10:17 1   Q.   Aleksandar Pance worked on the Echo products, right?

04:10:20 2   He worked on Project D. You said that. You testified

04:10:21 3   about that.

04:10:22 4   A.   No, I didn't say that. I said he didn't work on

04:10:25 5   Project D. It was Chris Coley. Every single project ever

04:10:29 6   done has its own silo, so it cannot physically even talk

04:10:34 7   with two people in the same room because they're blocked

04:10:36 8   off in different buildings, different floor, different

04:10:39 9   location. Access controls. Nothing was shared.

04:10:44 10   Aleks Pance -- at my time -- to the day I started

04:10:45 11 to the day I ended my employment there, was only working on

04:10:49 12 Project B, like Baker, the phone only. Every single person

04:10:53 13 on that email chain is on Fire Phone only, because we are

04:10:58 14 not allowed to go across departments. It was complete

04:11:02 15 blocked off from each other.

04:11:03 16   So I actually never worked on the Project D in my

04:11:08 17 time at Amazon. It's physically not possible because it's

04:11:13 18 physically blocked off. The suppliers meeting cannot be

04:11:16 19 shared, as well, because at that time, Amazon was so afraid

04:11:20 20 that people know that and find out different things. It

04:11:23 21 was complete silo.

04:11:24 22   There was no cross communication between the

04:11:26 23 engineering department. Even when we went to have

04:11:30 24 meetings, it had to be done one-by-one. It was never

04:11:34 25 allowed to be in the same room.

04:11:36 1   Q.   But you worked on Project D, right? You -- you worked

04:11:38 2   on both projects, didn't you?

04:11:40 3   A.   Correct. But it wasn't -- I was fully function. So

04:11:44 4   when they fully function, we start the project. But we --

04:11:47 5   Q.   You weren't siloed, were you?

04:11:50 6   A.   I wasn't siloed because I was fully functioning. I

04:11:55 7   wasn't in design for this.

04:11:56 8   Q.   So you just closed your eyes, did not want to know

04:11:59 9   anything about Li Creative Technologies' information that

04:12:03 10 may be relevant for Project D after you received this

04:12:07 11 presentation?

04:12:08 12 A.   Correct, correct. Because I'm not allowed to go ahead

04:12:11 13 and share information even between projects. So whatever

04:12:16 14 happens stay within that silo. It doesn't go out.

04:12:22 15 Q.   So you would have received this information, and you

04:12:27 16 would have just locked it up and not told anybody about it.

04:12:30 17 That's your testimony, right?

04:12:31 18 A.   Only for the people that were disclosed on that

04:12:34 19 project. I would not share information out. They say

04:12:37 20 clearly -- those people in the meeting got information

04:12:39 21 directly from Li Creative, but that's only one project.

04:12:43 22   We are not allowed to send information across

04:12:46 23 project. Every single project Amazon have specific NDA

04:12:50 24 that does not allow us to do that. I have even different

04:12:55 25 address, different files, but I cannot cross two different

04:12:59   1   locations.

04:13:01   2   Q.   The NDA for this project, for the project of Li

04:13:05   3   Creative Technologies, that wasn't limited to the Fire

04:13:09   4   Phone, right?

04:13:10   5   A.   That a specific NDA form.

04:13:17   6   Q.   It was a standard NDA form, right? It wasn't limited

04:13:20   7   to the Fire Phone project, right?

04:13:22   8   A.   Correct. The people who were on that project sign a

04:13:27   9   specific project NDA. So I have NDA for both Project A, B,

04:13:33   10   C, D. I have for every single one of them. I have NDA for

04:13:39   11   them across the board. The project, three or four people

04:13:42   12   that does that.

04:13:46   13   Q.   I'm not asking about your NDA with Amazon. I'm asking

04:13:50   14   you about the NDA Li Creative signed with Amazon. That NDA

04:13:53   15   was not specific to the Fire Phone, correct?

04:13:57   16   A.   I don't have any details, I don't know, but most likely

04:14:03   17   it's not.

04:14:03   18   Q.   Did Lab126 have any restrictions on interactions

04:14:08   19   between the project team?

04:14:08   20   A.   Yes.

04:14:09   21   ATTORNEY: Objection.

04:14:10   22   A.   Basically, from physical of location of office space,

04:14:13   23   they were not on the same floor. The door was locked. So

04:14:17   24   physically they could not access. We were in lobby, but

04:14:21   25   people in different floor in different rooms. The document

04:14:24 1 was complete siloed inside of cloud. So we can only see

04:14:28 2 what project we're working on. So everything else is

04:14:32 3 blocked. We don't see what other is doing. Nothing is

04:14:35 4 shared. Each -- each person had to sign a specific NDA

04:14:41 5 specifying we cannot cross-contaminate. So each one was

04:14:46 6 treated as silo.

04:14:49 7 Q. All right. You mentioned that the door was locked.

04:14:53 8 What did you mean by that?

04:14:55 9 A. So, basically, the room would be cut in half or may be

04:14:55 10 different floor. You could not actually work. For

04:14:58 11 example, I was disclosed on the project, so I could go to

04:15:08 12 that floor. Other people cannot go into that floor. They

04:15:08 13 could not physically go into the lab or physically to the

04:15:12 14 people, because it was not done.

04:15:13 15   So, physically, different floor, different rooms

04:15:15 16 within the floor, complete silo. Like the Project B is in

04:15:19 17 entire section on the left-hand side of the room. The Fire

04:15:23 18 team would be on their own side of the building. And that

04:15:26 19 would be further fabricated.

04:15:27 20 Q. So in addition to the physical restrictions, were there

04:15:34 21 restrictions on communications or talking?

04:15:36 22 A. Yes.

04:15:39 23   ATTORNEY: Objection to form. Objection to form.

04:15:41 24 Q. What were those restrictions?

04:15:43 25 A. Basically, every single -- so from our side, every

04:15:48   1   single project has this NDA that every single person who

04:15:52   2   work on that project needs to sign. It was -- it was very

04:15:54   3   clear that we cannot talk to anyone who does not work on

04:15:57   4   this project.

04:15:57   5   We cannot share information, cannot share

04:15:59   6   documents. Each project is in its own dedicated space on

04:16:05   7   the cloud. Even my boss didn't know what I was working on

04:16:09   8   because I didn't tell him what was happening. He only told

04:16:12   9   me because I do. He had no idea what I was doing.

04:16:16   10   Q.   And did Lab126 have policies about using technology of

04:16:22   11   third-party suppliers from meetings it had conducted?

04:16:25   12   A.   No, unless we decide to go and proceed with the

04:16:30   13   contract and award business.

04:16:32   14   Q.   So, Mr. Wu, you testified about who could go in and out

04:16:37   15   of certain floors in Amazon's building, right?

04:16:40   16   A.   Correct.

04:16:42   17   Q.   Now, you could get into Floor B or the space for B,

04:16:47   18   right?

04:16:47   19   A.   Correct.

04:16:49   20   Q.   You also could get into the space for D, couldn't you?

04:16:53   21   A.   Correct.

04:16:54   22   ATTORNEY: Objection, form.

04:16:54   23   Q.   But at some point in time, you were permitted by Amazon

04:16:58   24   to work on two different projects, Project B and Project D,

04:17:04   25   correct?

04:17:04   1   A.   Correct.

04:17:04   2   Q.   Now, with regard to employment agreements you had

04:17:08   3   referenced earlier, you've never seen anyone else's

04:17:11   4   employment agreement, have you?

04:17:13   5   A.   That's probably right.

04:17:15   6   Q.   Right. So you have no idea what Mr. Pance's employment

04:17:21   7   agreement said, do you?

04:17:22   8   A.   That's probably right, no.

04:17:24   9   Q.   So it's your testimony if he was co-mingling

04:17:27   10   information for Projects B and D, he would have been doing

04:17:30   11   something illegal, right, even against the law?

04:17:34   12   A.   Based on what you're saying, yes. We're not supposed

04:17:36   13   to do it.

04:17:36   14   Q.   You have no idea whether he used information from

04:17:39   15   Project B in his development of Project D, right? You

04:17:45   16   wouldn't know? You weren't there.

04:17:49   17   A.   After 2012, I don't know what happened when I left.

04:18:03   18   But prior to that, there was no cross-pollination under my

04:18:08   19   watch. It was very clear that could not be done.

04:18:12   20   Q.   Now, you weren't at the meeting between Li Creative

04:18:15   21   Technology and Amazon, right? You weren't at that meeting?

04:18:19   22   A.   Probably not.

04:18:19   23   Q.   You were on vacation. You said it in your email, you

04:18:24   24   were on vacation, you were out -- our of the office.

04:18:27   25   A.   I was traveling for work.

04:18:29 1   Q.   You were traveling.   You couldn't have been at the

04:18:31 2   meeting, right?

04:18:32 3   A.   Could be.   I don't know.   I need to check my -- I mean,

04:18:34 4   I come to see -- that's a busy time in my life.   I don't

04:18:41 5   know.   It's 10 years ago.

04:18:41 6   Q.   But you don't remember the meeting?

04:18:43 7   A.   I have tons of supply meetings.   It's hard for me to

04:18:49 8   record every single one of them.

04:18:51 9   Q.   So you don't know whether anyone from Project D

04:18:55 10 attended that meeting, correct?   You just -- you just can't

04:18:58 11 tell me yes or no with certainty whether anyone from

04:19:01 12 Project D attended that meeting, right?

04:19:03 13 A.   I wasn't physically there, so I cannot tell you.   But

04:19:13 14 the email expose that, only Project B did.

04:19:22 15 Q.   And you think there were only about six or seven people

04:19:25 16 at that meeting, right?

04:19:27 17 A.   Roughly, yes.

04:19:28 18 Q.   Do you know how many people were on the Project B team?

04:19:32 19 A.   At the time, it was over a hundred.

04:19:38 20 Q.   And Project D only had about a handful, right?

04:19:47 21 A.   Less than five as of December 2011.

04:19:52 22   (Videoclip ends.)

04:19:56 23   THE COURT: Does that complete this witness by

04:19:58 24 deposition, counsel?

04:19:59 25   MR. LAMBRIANAKOS: Yes, Your Honor.

04:20:00 1   THE COURT: All right. Ladies and gentlemen,

04:20:03 2 before we proceed with the next Plaintiff's witness, we're

04:20:06 3 going to take a short recess.

04:20:08 4   If you will simply leave your notebooks closed and

04:20:11 5 in your chairs, follow all the instructions I've given you

04:20:15 6 about your conduct, including not to discuss the case with

04:20:17 7 each other, we'll try to make this relatively short,

04:20:21 8 approximately 10 minutes, and we'll be back to proceed with

04:20:24 9 the Plaintiff's next witness at that time.

04:20:25 10   With those instructions, the jury is excused for

04:20:28 11 recess.

04:20:28 12   COURT SECURITY OFFICER: All rise.

04:20:29 13   (Jury out.)

04:20:56 14   THE COURT: Be seated, please.

04:20:56 15   Plaintiff, who will your next witness be?

04:21:01 16   MR. FABRICANT: Your Honor, we have additional

04:21:03 17 video depositions today. Mr. Lambrianakos has the times of

04:21:09 18 those depositions.

04:21:10 19   THE COURT: Tell me what those are. I'd like to

04:21:13 20 get some idea of what we have for the rest of the day.

04:21:15 21   MR. FABRICANT: Yes, sir.

04:21:16 22   THE COURT: When -- when do you expect your

04:21:18 23 expert, Mr. Alexander [sic] to go on?

04:21:21 24   MR. FABRICANT: Your Honor, in light of the time

04:21:22 25 and the deposition videos that we have, we would intend to

04:21:26   1   start Mr. McAlexander first thing Monday.

04:21:29   2   THE COURT: All right. Let me hear about the

04:21:31   3   remaining witnesses by deposition.

04:21:34   4   MR. LAMBRIANAKOS: Your Honor, we have Amit

04:21:37   5   Chhetri for approximately 27 minutes; Mr. Wai Chu for

04:21:41   6   approximately 13 minutes; Mr. Carlo Murgia for

04:21:49   7   approximately 13 minutes; and Mr. Philip Hilmes for

04:21:54   8   approximately 18 minutes. Approximately an hour and 10

04:22:00   9   minutes total, Your Honor.

04:22:01   10   THE COURT: I get an hour and 11. Okay.

04:22:09   11   All right. That tells me what I need to know.

04:22:11   12 We'll take a short recess, and then we'll return.

04:22:13   13   The Court stands in recess.

04:22:15   14   COURT SECURITY OFFICER: All rise.

04:46:29   15   (Recess.)

04:47:03   16   (Jury out.)

04:47:03   17   COURT SECURITY OFFICER: All rise.

04:47:06   18   THE COURT: Be seated, please.

04:47:07   19   Mr. Rubino, do I understand you're going to

04:47:19   20 directly examine the next witness?

04:47:21   21   MR. RUBINO: Yes, Your Honor.

04:47:22   22   THE COURT: You may go to the podium and set up.

04:47:24   23   If there are binders to pass out, let's get those

04:47:29   24 done.

04:47:29   25   And in the meantime, let's bring in the jury.

04:47:33 1   COURT SECURITY OFFICER: All rise.

04:47:34 2   (Jury in.)

04:48:03 3   THE COURT: Please be seated.

04:48:04 4   Plaintiff, call your next witness.

04:48:09 5   MR. RUBINO: Your Honor, Plaintiff's next witness,

04:48:13 6 we call Mr. Joseph McAlexander.

04:48:15 7   THE COURT: All right. Mr. McAlexander, if you'll

04:48:18 8 come forward and be sworn, please.

04:48:34 9   COURTROOM DEPUTY: Right here, sir.

04:48:35 10   (Witness sworn.)

04:48:42 11   THE COURT: Please come around, sir. Have a seat

04:48:46 12 here at the witness stand.

04:48:58 13   Mr. Rubino, you may proceed with your direct

04:49:01 14 examination whenever you're ready.

04:49:05 15   MR. RUBINO: Thank you.

04:49:05 16   JOSEPH C. MCALEXANDER, III, PLAINTIFF'S WITNESS, SWORN

04:49:05 17   DIRECT EXAMINATION

04:49:10 18 BY MR. RUBINO:

04:49:10 19 Q. Good afternoon. Can you please state your name for the

04:49:14 20 record?

04:49:14 21 A. Joseph Colby McAlexander.

04:49:16 22 Q. And, Mr. McAlexander, who's retained you in this

04:49:19 23 matter?

04:49:20 24 A. I've been retained by Fabricant on behalf of the

04:49:24 25 Plaintiff.

04:49:24 1   Q.   Are you being compensated for your work in this case,

04:49:29 2   sir?

04:49:29 3   A.   Yes, I am.

04:49:29 4   Q.   How are you compensated?

04:49:31 5   A.   Compensated at the rate of $575.00 an hour.

04:49:34 6   Q.   Could you please tell us and the jury a little bit

04:49:41 7   about yourself, apart from testifying as a technical

04:49:45 8   expert?

04:49:45 9   A.   Certainly. I live north of Dallas, about 50 miles. My

04:49:49 10 wife and I have a small ranch there that we are state

04:49:54 11 certified to work with equine therapy and personal

04:49:57 12 development of wellness.

04:49:58 13   And apart from that, I have two sons, one who

04:50:03 14 works with me, my youngest. My oldest son is -- as of 30

04:50:09 15 minutes ago, has retired after 25 years as a commander in

04:50:13 16 the Navy, now looking for a job.

04:50:18 17   I have been involved in the electronics industry

04:50:21 18 since 1972, after serving three years in the military as an

04:50:25 19 Army captain.

04:50:26 20   And my career basically was 1972 to 1986 as a

04:50:34 21 designer and manager of -- at Texas Instruments.

04:50:39 22   And I spent another four or five years as the vice

04:50:44 23 president of technology for a service company working on

04:50:46 24 testing and evaluation of reliability assessments,

04:50:52 25 components, processors, that type.

04:50:55 1   And around -- around 1991 to 2002, I was the

04:51:03 2   technical manager of a company working in license and

04:51:06 3   litigation with regard to patents, doing quite a bit of

04:51:08 4   forensic analysis and evaluations, competitive analyses.

04:51:13 5   And since 2002, I've been president of my own

04:51:16 6   company. I've been working as a consultant in the

04:51:20 7   business.

04:51:21 8   Q. Do you have any degrees?

04:51:22 9   A. Yes, I have a Bachelor of Science in electrical

04:51:26 10 engineering.

04:51:26 11 Q. Where did you receive your Bachelor of Science from?

04:51:31 12 A. That was from North Carolina State University.

04:51:33 13 Q. And in retaining you for this case, what did

04:51:41 14 Plaintiff's counsel ask you to do?

04:51:43 15 A. Plaintiff's counsel asked me to review the '049 patent,

04:51:50 16 the prosecution history, any communication that was between

04:51:53 17 the patentee and the -- and the Patent Office.

04:51:59 18   And to also purchase and evaluate some of the

04:52:01 19 accused products and render an opinion as to the -- the

04:52:08 20 validity of the patent, as well as whether or not any of

04:52:11 21 the accused products infringe the claims.

04:52:13 22 Q. At a very high level, what did you do -- what steps did

04:52:17 23 you take in conducting your analysis?

04:52:19 24 A. In conducting the analysis, at a high level, I first

04:52:23 25 acquired the patent, went through the patent in its

04:52:26 1   entirety, became familiar with the claims, became aware of

04:52:30 2   some of the terms and what they might mean. I adopted the

04:52:33 3   Court's construction for the claim terms, and then I

04:52:37 4   applied those claim terms to the products.

04:52:41 5   In terms of the products, I purchased each one of

04:52:44 6   the accused products. I analyzed the products, not only

04:52:50 7   externally, but I took them apart. I made sure that I

04:52:53 8   understood -- stood exactly what the structural components

04:52:58 9   were within the -- within the system itself, each one of

04:53:01 10   the accused products.

04:53:02 11   I further evaluated a number of documents that

04:53:04 12   have been produced in this case by both the Plaintiff and

04:53:07 13   the Defendant. Did a number of website searches.

04:53:12 14   When I identified products -- components that were

04:53:15 15   inside of the com -- inside of the accused products, such

04:53:19 16   as a processor, I then acquired the data sheets on those

04:53:24 17   processors. This is what the manufacturer of the

04:53:26 18   particular processor tells the public about how that system

04:53:29 19   operates. That's generally what I did.

04:53:37 20   MR. RUBINO: Could we please put up Plaintiff's 1,

04:53:41 21   please?

04:53:41 22   Q.   (By Mr. Rubino) Do you recognize this document, sir?

04:53:43 23   A.   Yes. This is the reissued patent, RE47,049. I'll

04:53:49 24   refer to it as the '049 patent.

04:53:51 25   Q.   And, again, at a high level, what you were analyzing in

04:53:55 1   this patent?

04:53:56 2   A.   At a high level, I -- I reviewed the patent itself --

04:54:00 3   at a very high level, first of all, identifying the patent

04:54:03 4   number and the date that it issued, which was September

04:54:06 5   18th, 2018.

04:54:07 6   Also noted that the inventors were two inventors,

04:54:13 7   Zhu and Dr. Li.

04:54:15 8   And I also identified the assignee of the patent

04:54:19 9   was Li Creative Technologies.

04:54:19 10   I also noticed on the front page of the patents a

04:54:22 11 number of other items, such as the reissue date, and,

04:54:26 12 specifically, the provisional application filing date of

04:54:37 13 September 24th, 2010.

04:54:38 14 Q.   Would any demonstrative materials assist you in your

04:54:42 15 presentation today?

04:54:42 16 A.   Yes.   I had put together some demonstratives that I

04:54:48 17 believe will be clearly delineating what I have found in my

04:54:49 18 assessment of the case, and I believe they will help serve

04:54:52 19 the jury to walk through these, rather than doing it at a

04:54:55 20 high level.

04:54:55 21 Q.   So you -- you briefly touched on, I think, the college

04:55:03 22 degree.   But can you please state more fully your

04:55:07 23 experience and qualification to testify here today?

04:55:12 24 A.   Yes.   I started my career in the electronics business

04:55:16 25 about 48 years ago.   I have been an integrated circuit

04:55:23 1 designer. So I have designed different types of memory

04:55:26 2 components that go into major systems both in computer

04:55:32 3 service and notebook computers.

04:55:35 4   I've designed chips that go into -- to

04:55:39 5 smartphones. And with the -- within the construct of

04:55:45 6 integrated circuit design, I've designed such things as

04:55:50 7 detectors, sense amplifiers, address buffers for the

04:55:56 8 purposes of addressing certain features or segments of a

04:56:00 9 device, input/output profits for data collection.

04:56:06 10   I have designed voltage regulators, products that

04:56:09 11 are called level shifters that will lower the voltage or

04:56:14 12 level the voltage up when they go into different

04:56:17 13 components. Timing -- timing circuits, delay circuits.

04:56:26 14 Most of these types of circuits go into digital signal

04:56:29 15 processors. And so that's my design experience.

04:56:34 16   I've also designed from a forensic standpoint,

04:56:39 17 scanning microscopy and inductively coupled plasma for

04:56:43 18 chemical -- and both physical and chemical analyses of

04:56:45 19 products.

04:56:45 20   In my design of integrated circuits, I've worked

04:56:51 21 closely with the fabrication process. In fact, managed the

04:56:55 22 quality or reliability organization for an integrated

04:56:58 23 circuit fab -- fabrication facility where the actual

04:57:02 24 creation of the circuits occur.

04:57:03 25   I have also managed for three years the back end,

04:57:06   1   which is the assembly and the test and the deliverables to

04:57:09   2   clients.

04:57:10   3   So my experience with components that go into

04:57:14   4   computer systems is all the way from initial design to

04:57:18   5   system implementation at a customer's house.

04:57:27   6   Q.   You heard some of the testimony that was said in court

04:57:30   7   today, right, sir?

04:57:31   8   A.   Yes, I have.

04:57:32   9   Q.   And you heard someone say the word "source code" at

04:57:35 10   some point, right?

04:57:36 11   A.   That's correct.

04:57:37 12   Q.   Can you speak a little bit to whether you have any

04:57:40 13   experience with source code?

04:57:41 14   A.   Yes.   Source code, as a general term, is typically used

04:57:48 15   in regards to what a particular creator of a program will

04:57:54 16   initiate on a computer.   So they have a human-readable

04:57:58 17   input using a particular type of programming language.   And

04:58:01 18   they will develop the code.   That's called source code.

04:58:05 19   Sometimes it is used to refer to the code that's

04:58:08 20   actually implemented into a component that's in a system.

04:58:15 21   Most -- most people refer to that as firmware, rather than

04:58:19 22   source code, but, in general, they're the same.

04:58:20 23   The source code that's in human-readable language

04:58:24 24   is then compiled in a -- into a different language of logic

04:58:29 25   0s and 1s -- in other words, high/low values.   But just

04:58:33   1 two -- two states, but it's compiled in a way that the

04:58:36   2 computer systems understand.

04:58:37   3   And it is these values of 0 and 1 that are then

04:58:41   4 actually programmed into the device, and that provides what

04:58:45   5 I call the instruction set by which the device operates.

04:58:50   6   So it originally starts from a human-readable

04:58:53   7 source code that's compiled into human-readable -- into

04:58:56   8 machine language, and then programmed into the device.

04:58:59   9   I've had experience in the designing and the

04:59:03 10 implementation, the programming, and I've also had a lot of

04:59:07 11 experience in actually going into an already completed

04:59:10 12 product, do what's called reverse engineering and -- and

04:59:14 13 define what the code originally was.

04:59:20 14 Q. And so do you -- do you have any experience reading

04:59:23 15 code?

04:59:23 16 A. Yes. As a consultant, I have been retained by a number

04:59:29 17 of different clients for evaluation of code, comparison of

04:59:36 18 code. Between different facilities, I've actually done a

04:59:39 19 study at one time on comparing what was considered to be

04:59:42 20 clean-room code to ensure that it actually was behind

04:59:45 21 closed doors and it was not contaminated.

04:59:48 22   And when it comes to litigation cases, I --

04:59:55 23 it's -- it's very typical to have code that's been

04:59:58 24 available -- made available that identifies how certain

05:00:01 25 components work, and I'm -- I have spent many, many cases

05:00:05   1   reading code to evaluate exactly what that code says and

05:00:07   2   how it operates.

05:00:10   3   Q.   Do you have any teaching experience, sir?

05:00:13   4   A.   I do not have academic teaching experience in a

05:00:16   5   university, but as a -- as an engineer, in three or four of

05:00:23   6   the companies that I have managed or operated in, I've

05:00:25   7   actually taught solid state physics. I have taught -- I

05:00:31   8   have taught statistical control. I've -- I've also taught

05:00:35   9   integrated circuit design, as well as integrated circuit

05:00:38   10   fabrication.

05:00:39   11   So -- and -- and, lastly, assembly and test. So

05:00:42   12   I've actually instructed the internal engineers both here

05:00:45   13   and overseas in Asia on various techniques that are

05:00:50   14   required in order for them to do their job correctly.

05:00:53   15   So the -- the teaching I have done has been

05:00:55   16   internal to organizations.

05:00:57   17   Q.   Can you speak to any other experience you have serving

05:01:07   18   as an expert witness?

05:01:08   19   A.   Well, I -- I am a registered professional engineer in

05:01:13   20   electrical engineering in the State of Texas. In terms of

05:01:16   21   professional experience, I have been retained in a number

05:01:20   22   of cases. I've testified 50 or 60 times in court. My

05:01:28   23   experience has covered a number of different areas,

05:01:32   24   including audio, when it comes to sound as it applies to

05:01:37   25   entertainment.

05:01:38 1   I've also provided testimony with regard to the

05:01:44 2 integration of -- of devices such as smartphones and

05:01:49 3 automobiles, using both Bluetooth or WiFi or hardwire

05:01:56 4 connection.

05:01:57 5   I've testified in a number of cases that go to

05:01:59 6 protocol for communication -- data communication both in

05:02:05 7 wired, as well as wireless.

05:02:10 8   My testimony has also been on a number of cases

05:02:13 9 that involve audio transmission underwater. I represented

05:02:18 10 one client for underwater communication.

05:02:22 11   And I also worked for about 12 years with a

05:02:25 12 company that -- that actually designed underwater dive

05:02:30 13 computers, and we investigated and actually instantiated

05:02:34 14 the ability to do voice underwater with that, as well.

05:02:38 15 Q. And do you consider -- consider yourself to be an

05:02:44 16 expert in any field, sir?

05:02:45 17 A. Yes, certainly that involving electric and

05:02:53 18 electromechanical. But more specifically, my -- my company

05:02:55 19 started in 1988 in designing sound systems. And so when it

05:03:03 20 comes to the -- the area of -- of acoustics, I do have

05:03:06 21 expertise in that.

05:03:12 22   MR. RUBINO: At this time, Plaintiff offers Joseph

05:03:16 23 C. McAlexander as an expert witness in the area of acoustic

05:03:17 24 systems implementations.

05:03:18 25   THE COURT: Is there objection?

05:03:19   1   MR. HADDEN: No, Your Honor.

05:03:19   2   THE COURT: Without objection, the Court will

05:03:22   3 recognize this witness as an expert in the designated

05:03:26   4 field.

05:03:26   5   Please continue, Mr. Rubino.

05:03:29   6 Q. (By Mr. Rubino) Sir, what material have you considered

05:03:34   7 in preparation for your testimony?

05:03:37   8 A. I've considered the '049 patent, the prosecution

05:03:43   9 history -- again, the communication between the patentee

05:03:45   10 and the Patent Office.

05:03:50   11   I have considered documents that have been

05:03:51   12 produced by both the Plaintiff and the Defendant in this

05:03:55   13 matter, specifically documents pertaining to the accused

05:03:59   14 Amazon products.

05:04:03   15   I have also considered website information that is

05:04:06   16 publicly available concerning the accused products. I have

05:04:11   17 also considered the Court's claim construction and adopted

05:04:14   18 that as I've applied it to the accused products. I've also

05:04:19   19 looked at deposition testimony. I've also been present

05:04:28   20 listening to the deposition transcripts being played today.

05:04:31   21   In addition to that, I have also looked at a

05:04:33   22 number of different manuals in the area of -- of acoustics,

05:04:39   23 as -- as it is in preparation for this matter.

05:04:43   24   I've also looked at source code that's been

05:04:45   25 produced in this case. And the source code is relevant to

05:04:53 1 each one of the accused products.

05:04:54 2 Q. So with regard to the patent, what parts of the patent

05:04:56 3 did you review?

05:04:57 4 A. How about all of it.

05:05:00 5 Q. Have you heard of something called the prosecution

05:05:03 6 history or file history?

05:05:04 7 A. Yes. I've reviewed the patent, but I've also reviewed

05:05:08 8 what I indicated as the prosecution history. And that is

05:05:10 9 the file -- it's sometimes referred to as the file wrapper,

05:05:13 10 but it's -- it's what the Patent Office retains on file

05:05:16 11 that marks all of the communication and all the

05:05:19 12 documentation that has transpired between the patent owner

05:05:23 13 and the Patent Office.

05:05:24 14 Q. And you've reviewed that full record?

05:05:28 15 A. Yes, I have.

05:05:28 16 Q. Now, regarding Amazon's products, have you looked at

05:05:38 17 any physical products?

05:05:39 18 A. Yes, I have looked at physical products. I actually

05:05:43 19 procured physical products, photographed them, and actually

05:05:47 20 took every one of them apart.

05:05:48 21 Q. Aside from investigating physical products, have you

05:05:51 22 looked at Amazon documents?

05:05:53 23 A. Yes. Amazon produced a number of documents in this

05:05:58 24 case relevant to the particular products that have been

05:06:02 25 accused. And so I have -- yes, I have reviewed those.

05:06:06   1   Q.   So other than the source code, what types of documents

05:06:12   2   are those, sir?

05:06:13   3   A.   The documents include emails -- you said other than

05:06:23   4   source code?

05:06:24   5   Q.   Yes, sir.

05:06:24   6   A.   Email.   There are documents that I would put in the

05:06:30   7   category of marketing material, publicly-applied or

05:06:35   8   available material, that describes the particular items

05:06:39   9   that are accused.

05:06:43   10   I've looked at website information generally,

05:06:45   11   which overviews some of the technology.   I've looked at

05:06:49   12   publications by some of the Amazon employees that are

05:06:54   13   directed specifically to some of these accused products or

05:06:58   14   the way in which they operate.

05:07:06   15   Q.   And with regard to the source code, how did you look at

05:07:11   16   that source code?

05:07:13   17   A.   The source code was produced on a stand-alone computer

05:07:16   18   in a secure area.   And it is -- it was not produced as an

05:07:23   19   executable code, but it was produced in different files,

05:07:25   20   much like when you go into Windows and you look at Explorer

05:07:29   21   and you can look at the different file structure.   And they

05:07:32   22   were produced in two separate folders because there's two

05:07:36   23   different types of code.

05:07:40   24   And so then basically you can just navigate

05:07:43   25   through the tree of the different files in those folders

05:07:46   1   and identify how it operates.

05:07:51   2   Q.   And so you said you looked at it on a -- on a secure

05:07:55   3   computer.   Can we look at it here in court?

05:07:58   4   A.   Could.   I would assume so.

05:08:01   5   Q.   So what is it going to look like if we were to take a

05:08:05   6   look at this code in court today?

05:08:07   7   A.   Well, it'd be like looking at an electronic file,

05:08:12   8   but -- but as a part of my evaluation, I was permitted to

05:08:15   9   print -- or request print of some of the files and some

05:08:19   10   portions of the files.   And that's what I actually operated

05:08:22   11   off of after I reviewed the code on the electronic version.

05:08:26   12   Q.   And you said you -- you looked at a ruling called a

05:08:39   13   claim construction ruling.   What is that, sir, at a high

05:08:45   14   level?

05:08:45   15   A.   At a high level, the -- the -- there's two steps of the

05:08:48   16   process of asserting a claimed invention against a product

05:08:53   17   to determine whether that product practices that invention.

05:08:56   18   The first step is proper construction of the

05:08:58   19   claims, construing the claim terms.   And so certain terms

05:09:02   20   were construed by the -- by this Court and provided in a

05:09:07   21   claim construction order.   And -- and I adopted those claim

05:09:11   22   constructions in my analysis as I then applied it against

05:09:14   23   the accused products.

05:09:15   24   Q.   Did you apply any other legal standards in your

05:09:28   25   analysis?

05:09:29   1   A.   I -- I was informed of legal standards that would be

05:09:34   2   pertinent to this matter, specifically legal standards with

05:09:38   3   regard to infringement and specifically as it -- as it

05:09:44   4   revolved around direct and indirect infringement.

05:09:46   5   Q.   So when you're analyzing these claims of infringement,

05:09:55   6   is there a perspective you're supposed to take?

05:09:58   7   A.   Yes.   Analyzing the patent claims is supposed to be

05:10:04   8   done not through the eyes of an expert, not even through

05:10:08   9   the eyes of an attorney, but to be done through the eyes of

05:10:11 10   what is termed to be a person of ordinary skill in the art.

05:10:16 11   So it's important to identify at the time of the

05:10:18 12   invention who this person is.   And based upon that, then

05:10:23 13   the evaluation in terms of the way the patent claims are

05:10:26 14   applied is through the eyes of that person.

05:10:28 15   Q.   What factors did you consider when determining who this

05:10:34 16   person of ordinary skill is?

05:10:36 17   A.   There's a number of factors I considered.   It included

05:10:39 18   the education level of people in the industry at that time

05:10:44 19   in that particular field.   Considered the sophistication of

05:10:47 20   the technology that was at issue there.

05:10:51 21   Also considered the types of problems that were

05:10:54 22   available or apparent at that time and the solutions that

05:10:57 23   people were coming up with at that time.

05:11:01 24   And, lastly, as I recall, considered the speed at

05:11:05 25   which innovations were actually taking place at that time.

05:11:07   1   So these are the primary things -- five factors I

05:11:09   2   went through.

05:11:10   3   Q.   And what's the relevant time period for this person of

05:11:15   4   skill in the art?

05:11:15   5   A.   Around September 24th, 2010, the time of the invention.

05:11:19   6   Q.   And so after analyzing these factors, have you made any

05:11:24   7   conclusion regarding who this person of ordinary skill in

05:11:29   8   the art is, what qualifications they may have?

05:11:34   9   A.   Yes. I concluded, based upon evaluating those factors,

05:11:38   10 that the person of skill in the art -- ordinary skill in

05:11:42   11 the art at the time of the invention would be a person who

05:11:44   12 would have a Bachelor of Science degree in electrical

05:11:47   13 engineering, or equivalent, and several years of working in

05:11:49   14 the field, either implementing or designing acoustic-type

05:11:55   15 systems.

05:11:57   16 Q.   So regarding the legal standards you referred to a few

05:12:05   17 minutes ago, what is your understanding of how a party can

05:12:07   18 infringe a patent?

05:12:12   19 A.   My understanding from my tech -- it's my technical view

05:12:16   20 on this, but my understanding is anyone who makes, sells,

05:12:20   21 offers to sell, uses in the United States a patented

05:12:25   22 invention or someone who imports a patented invention is

05:12:30   23 deemed to be an infringer.

05:12:32   24 Q.   So, in your analysis, did you consider different types

05:12:48   25 of patent infringement?

05:12:49 1 A. Yes, I did.

05:12:50 2 Q. What types of patent infringement did you consider,

05:12:52 3 sir?

05:12:52 4 A. I considered two types, direct infringement and

05:12:57 5 indirect infringement.

05:12:58 6 Q. So what is your understanding of those two types of

05:13:04 7 infringement that you analyzed?

05:13:05 8 A. Direct infringement, as I understand, is when a

05:13:08 9 particular entity creates a product, makes a product,

05:13:17 10 offers to sell a product, sells the product, uses the

05:13:20 11 product, or imports the product. That person is deemed to

05:13:23 12 be -- that person or entity is deemed to be an infringer

05:13:27 13 directly if -- if by such an act each one of the

05:13:32 14 elements/limitations of a claim are practiced.

05:13:35 15   So if you -- if that person or entity practices

05:13:38 16 all of a claim, then that is -- that is to my understanding

05:13:40 17 to be a direct infringer.

05:13:41 18 Q. What understanding did you apply for indirect

05:13:50 19 infringement?

05:13:50 20 A. My understanding for indirect infringement is that

05:13:53 21 there has to be still a determination of a direct

05:13:56 22 infringer.

05:13:57 23   And then for indirect, it's -- it's whether a

05:14:03 24 particular party has induced or contributed to infringement

05:14:06 25 such that that other party does infringe. So that would be

05:14:12   1   indirect infringement.

05:14:13   2   Q.   At a high level, what were the conclusions that you

05:14:19   3   came to here?

05:14:20   4   A.   At a high level, I came to the conclusion that the end

05:14:23   5   user or customer of Amazon that purchases a system

05:14:31   6   infringes that -- infringes the asserted claims of the

05:14:34   7   patent in this case directly when they use that system.

05:14:39   8   I also came to the conclusion that Amazon

05:14:44   9   indirectly infringes by inducing or contributing to

05:14:47   10 infringement with that end user.

05:14:50   11   MR. RUBINO: May we please have PTX-1?

05:14:54   12 Q.   (By Mr. Rubino)   Sir, can you please explain the -- to

05:15:10   13 the jury the parts of a U.S. patent?

05:15:14   14 A.   Certainly.

05:15:15   15 Q.   Do you have any demonstratives on this?

05:15:16   16 A.   I do have some demonstratives that I have produced that

05:15:19   17 I think would help us to navigate through this easier than

05:15:28   18 me drawing it on the screen.

05:15:34   19   So if I can step through this.   On the -- on the

05:15:38   20 front of the patent, sometimes referred to as the face

05:15:41   21 page, and in the patent, you'll notice that the -- the

05:15:47   22 patent number that's been assigned by the Patent Office and

05:15:49   23 the issue date is in the upper right corner.

05:15:55   24   You can also tell that in the upper left corner is

05:15:58   25 the name of the primary inventor.

05:16:00   1   And then several lines down on the left side is a

05:16:03   2   section called the inventors. And that's where the

05:16:06   3   identification of the two inventors is identified -- is

05:16:09   4   made.

05:16:10   5   And then further down in the left column, there is

05:16:16   6   a statement that's -- that tells you when the patent

05:16:18   7   application was filed and that it depends from a

05:16:22   8   provisional application called the '952 that was filed on

05:16:27   9   September 24th, 2010. And that would be the date -- the

05:16:32 10   effective date of the patent as far as the invention is

05:16:35 11   concerned, September 24th, 2010. So that's on the first

05:16:38 12   page.

05:16:38 13   Also on the first page is another section -- if I

05:16:43 14   can have the next slide -- that's called the abstract of

05:16:46 15   the invention.

05:16:48 16   And in the abstract of the invention, the inventor

05:16:50 17   sets forth in general terms at a high level the field and

05:16:55 18   the scope of the invention itself. And you'll also notice

05:17:01 19   that on the first page, there are references cited.

05:17:04 20   I heard Dr. Zhu allude to this earlier, that these

05:17:10 21   are references that were either provided by the patentee or

05:17:13 22   by the examiner at the Patent Office.

05:17:15 23   And this is a list of the references that were

05:17:18 24   considered when the Patent Office was reviewing this

05:17:21 25   particular application for issuance.

05:17:23 1   Also, notice at the bottom of the abstract, it

05:17:28 2 identifies on the face page that at the back of the patent,

05:17:33 3 there will be 35 claims -- 35 separate claimed inventions,

05:17:37 4 and that there is also an indication that there are 34

05:17:41 5 drawing sheets.

05:17:42 6   So if we can go to the next slide.

05:17:44 7   This is an example of one of the drawing sheets.

05:17:48 8 This is Figure 3 out of the patent, several pages back

05:17:52 9 in -- in -- from the face page.

05:17:53 10   And this is where the inventor for a number of

05:17:55 11 different figures begins to set forth in an illustrative --

05:18:00 12 illustrative manner what the invention is about. And these

05:18:04 13 are illustrations of the invention. They're sometimes

05:18:07 14 called embodiments.

05:18:10 15   And -- and basically one looks at this and

05:18:12 16 understands that this is the patentee attempting to give at

05:18:15 17 least some illustration of at least one way in which the

05:18:18 18 invention can be put into practice.

05:18:24 19   So as -- as we go through the patent further in

05:18:28 20 more detail -- I'll go through later, but you'll notice

05:18:30 21 that, for instance, this particular figure is about a

05:18:34 22 microphone array. The microphones are labeled as M_1, M_0,

05:18:38 23 M_3, and M_2. And these are located in a circular pattern.

05:18:42 24   So the configuration is a circular array of four

05:18:46 25 microphones.

05:18:46   1   Okay. If we go to the next slide.

05:18:53   2   Q.   Thank you, sir.

05:18:54   3   And after the drawing sheets, what comes after

05:18:57   4   that?

05:18:57   5   A.   All right. If we can go to the next slide after the

05:19:01   6   drawing sheets.

05:19:02   7   It becomes -- we get to what's called the written

05:19:05   8   description part of the patent. What I've highlighted here

05:19:11   9   is the detailed description of the invention. There's also

05:19:15   10   a background section, a summary of the invention, and then

05:19:18   11   it goes into the detailed description of the invention.

05:19:20   12   This is where the inventor begins to set forth the

05:19:23   13   ground rules for his -- for his invention. He sets -- sets

05:19:26   14   in motion what that is, generally.

05:19:30   15   You can see in this particular instance, he's

05:19:32   16   referring to one of the figures, Figure 1 in the patent.

05:19:35   17   And so when he goes to that, he is basically doing

05:19:38   18   a write-up, a written description of the -- that

05:19:42   19   corresponds with the figures.

05:19:43   20   And you'll go through the specification all the

05:19:48   21   way to Column 21, and -- and that basically -- he takes

05:19:51   22   figure-by-figure and goes through a written description

05:19:54   23   about that.

05:19:54   24   Next slide.

05:20:01   25   So at the back of the patent, we get to the next

05:20:04   1   section, and it's called the claims. This is where the

05:20:07   2   inventor sets forth the actual invention, because each

05:20:13   3   claim is an invention.

05:20:16   4   And here I have with this demonstrative brought up

05:20:19   5   an expanded version of Claim 1 of the patent. And you'll

05:20:25   6   notice that it starts at the back of the patent -- patent

05:20:29   7   specification with the words "we claim," and then it shows

05:20:33   8   Claim 1. And we'll go through this in some detail later.

05:20:37   9   So this is the construct of the patent. It starts

05:20:40   10 with the face page, followed by illustrations or drawings,

05:20:44   11 followed by written description, and ends with the claims.

05:20:49   12 Q. Thank you, sir.

05:20:50   13   MR. RUBINO: Can we call up PTX-1 again? Claim 1,

05:21:17   14 please. Can you zoom out, please, Mr. Thompson. Thank

05:21:20   15 you.

05:21:20   16 Q. (By Mr. Rubino) Mr. McAlexander, are there different

05:21:22   17 types of claims?

05:21:23   18 A. Yes, there are. There are two different types of

05:21:25   19 claims, at a high level. One is called an independent

05:21:29   20 claim and the other is called a dependent claim.

05:21:31   21 Q. Do we have any of either of those types here?

05:21:33   22 A. Yes, there are two patent claims that are at issue in

05:21:36   23 this particular case, Claim 1 and Claim 8. Claim 1 is an

05:21:39   24 independent claim. Claim 8 is a dependent claim.

05:21:43   25 Q. And what makes a claim independent versus dependent?

05:21:49 1   A.   If I can have maybe enlarged just the preamble of

05:21:54 2   Claim 1, and then also Claim 8.

05:21:57 3   Okay.   So if we look at Claim 1, Claim 1 is an

05:22:16 4   independent claim, which means it stands on its own.   It

05:22:19 5   depends on nothing else.   And you'll see that the preamble,

05:22:21 6   the first part of that claim, reads: A method for

05:22:25 7   enhancing a target sound signal from a plurality of sound

05:22:29 8   signals.

05:22:29 9   This is the introduction to the claim, and it

05:22:33 10 depends on nothing else.   It's called an independent claim.

05:22:36 11   However, if you look at Claim 8 below, it says:

05:22:40 12 The method of Claim 1.

05:22:44 13   So that's a dependent claim.   And when it says a

05:22:48 14 method of Claim 1, that means that for a person or an

05:22:51 15 entity to practice Claim 8, we must -- I must be able to

05:22:55 16 find everything that's in Claim 1 plus the additional

05:22:58 17 requirement of Claim 8.

05:23:00 18   So the dependent claim requires everything from

05:23:03 19 the independent claim plus the additional requirements of

05:23:06 20 the dependent claim.

05:23:08 21 Q.   Thank you, sir.

05:23:17 22   Can you provide the jury with a high-level

05:23:19 23 overview of the patented technology?

05:23:21 24 A.   Yes.   The patented technology from the reissued patent

05:23:28 25 generally is -- is deriving toward what I'll call the front

05:23:35 1   end of -- of a particular process.

05:23:38 2   In order for a system to properly exercise when

05:23:44 3   it's voice actuated, there must be some mechanism by which

05:23:50 4   it's properly and repetitively being able to understand

05:23:53 5   what is being spoken. And so that's at the front end.

05:23:58 6   If it cannot understand what's being spoken, it's

05:24:01 7   kind of hard to obey the commands that come from that. So

05:24:06 8   when the voice command or statement is made, you want to

05:24:08 9   make sure the system properly understands that.

05:24:10 10   So at the front end of this, it's how to make sure

05:24:14 11   that when some word is being spoken that the system is

05:24:21 12   supposed to be tuned into, that it can not only properly

05:24:26 13   hear it, but it can properly hear it every time it's

05:24:29 14   spoken. As many times as possible. It's not a perfect

05:24:31 15   world, but we try to be as good as we can.

05:24:35 16   That somehow the system can determine and pick out

05:24:41 17   of all the noise that's in the environment the specific

05:24:43 18   word, so have an ability to know that it is a word spoken

05:24:46 19   from a human being, as compared to just ambient noise.

05:24:51 20   For instance, if we were to be silent here, which

05:24:54 21   I've not had it happen yet in this court, but if we were

05:24:58 22   just to be silent for 10 seconds, you can hear a background

05:25:04 23   hum. And so that's ambient noise. It can be from an air

05:25:08 24   conditioning unit.

05:25:10 25   But we may not be able to hear because we don't

05:25:13 1 listen for it is that we have AC current that is used to

05:25:20 2 create the lights, outlets, and it's -- it runs at 60

05:25:24 3 cycles per second. So it actually has a hum of 60 cycles

05:25:28 4 per second, and that's part of the ambient noise.

05:25:30 5   So that needs -- that noise needs to be canceled

05:25:34 6 when you are looking for -- being able to discriminate the

05:25:38 7 sound that you're looking for, the words that you're

05:25:41 8 looking for.

05:25:42 9   So part of what this invention is talking about is

05:25:44 10 how to best discriminate, pull out, retrieve the spoken

05:25:50 11 word that is -- that is -- that it's looking for. It's

05:25:55 12 called the target signal.

05:25:56 13   And, secondly, to be able to abate the

05:26:02 14 interference, which could be coming from other factors in

05:26:06 15 the ambient condition. Could be, as an example, there may

05:26:10 16 be three or four people talking in the room, but you really

05:26:13 17 want to listen to the specific word or command coming from

05:26:18 18 the one person.

05:26:19 19   So being able to get rid of disparate noise and

05:26:23 20 ambient noise, that's the mark of this patent, and it's

05:26:28 21 done in such a way that it can actually be applied across a

05:26:29 22 number of different products.

05:26:30 23 Q. Why is that important, sir? You mentioned sound

05:26:34 24 discrimination. Why is that important?

05:26:36 25 A. Sound discrimination is very key to this kind of a

05:26:41 1   process because I -- I put myself in as a user. If -- if

05:26:46 2   I'm working with a system and I want to state something, I

05:26:49 3   want that system to understand it. If the system comes

05:26:53 4   back with a response that says, huh, it's wasting my time.

05:26:58 5   I want it to be able to correctly discriminate, discern

05:27:02 6   what I am saying the first time and not have to do it again

05:27:06 7   and again and again to where it finally gets it.

05:27:10 8   Secondly, I don't want the system to misunderstand

05:27:12 9   what I'm saying and, therefore, respond in the wrong way.

05:27:16 10 So the clarity of being able to say something and have the

05:27:21 11 system pick it up is very, very vital. And that's what

05:27:26 12 this invention was directed to.

05:27:27 13 Q. Can you show me where this is described in the patent?

05:27:31 14   MR. RUBINO: I think we want Demonstrative 7,

05:27:34 15 Mr. Thompson.

05:27:38 16 A. There are several things that are discussed in the

05:27:41 17 patent. What I'm bringing up here, this demonstrative is

05:27:44 18 from Column 1 of the patent. And, specifically, this is

05:27:47 19 a -- this addresses the issue.

05:27:50 20   And it specifically says: However, the paradigm

05:27:56 21 of a single microphone often does not work effectively

05:28:00 22 because the microphone picks up many ambient noise signals

05:28:04 23 in addition to the desired sound, specifically when the

05:28:08 24 distance between a user and the microphone is more than a

05:28:11 25 few inches.

05:28:12   1   Let me just elaborate on that a minute.

05:28:16   2   If you are using the voice control for your

05:28:20   3   smartphone, talking to someone or calling up to tell Siri

05:28:25   4   to go somewhere, to look for something, that's very close.

05:28:31   5   And so that's called near-field. And very close, it's

05:28:34   6   basically the -- the microphones are tuned to something

05:28:38   7   that's very close. So it automatically segregates out

05:28:42   8   anything that's distant. It's a very narrow beam.

05:28:47   9   But when you are dealing with something that is

05:28:49   10 far-field, in other words, there's a distance away from the

05:28:53   11 system that's picking up the sound, the microphone, the

05:28:57   12 farther you get away, the more in the environment can

05:29:00   13 affect it.

05:29:01   14   And so in order to properly discriminate something

05:29:04   15 that's far away, there are a lot of different algorithms

05:29:08   16 and things that have to be done in order to account for

05:29:10   17 that.

05:29:11   18   So it's very important that it says the distance

05:29:14   19 between using the microphone only being a few inches,

05:29:19   20 therefore, there's a need for a microphone system that

05:29:21   21 operates under a variety of different ambient noise

05:29:24   22 conditions, and it places fewer constraints on the user

05:29:27   23 with respect to the microphone.

05:29:28   24   For example, you don't want to constrain the --

05:29:32   25 the -- the person that is using this from a distance to

05:29:35   1   only be in a specific space in the room. You want to be

05:29:38   2   able to have that user to be able to talk to the system

05:29:41   3   from anywhere in the room and even while the user is

05:29:45   4   moving.

05:29:46   5   So this is a very, very important thing to

05:29:49   6   overcome, and this is what the invention does.

05:29:51   7   Q. (By Mr. Rubino) At a high level, how does the invention

05:29:53   8   solve that problem?

05:29:54   9   A. I've got another slide here on Column 2 that addresses

05:29:57   10 that directly. It says beginning Line 5: The method and

05:30:07   11 system disclosed herein addresses the above stated need for

05:30:10   12 enhancing the acoustics of a target sound signal.

05:30:12   13   It says: As used herein, the term "target sound

05:30:17   14 signal" refers to a sound signal from a desired or target

05:30:22   15 sound source, for example, a person's speech that needs to

05:30:23   16 be enhanced.

05:30:24   17   So the inventor then in this next sentence says,

05:30:28   18 develops a microphone array system that comprises an array

05:30:32   19 of sound sensors. In other words, sound sensor can be a

05:30:35   20 microphone positioned in -- in an arbitrary configuration.

05:30:44   21   And it also identifies certain other elements that

05:30:47   22 are claimed, and that's a sound source localization unit,

05:30:49   23 an adaptive beamforming unit, and a noise reduction unit.

05:30:51   24 And I'll get into those in more detail later.

05:30:55   25   But the inventor invented a mechanism that works

05:31:00   1   and cooperates with an array of microphones or sensors that

05:31:06   2   are arranged in some kind of a pattern.

05:31:09   3   And in order to do this, the invention sets --

05:31:11   4   sets forth a way in which the microphone array is arranged

05:31:14   5   in such a way that it can actually, with the signals that

05:31:17   6   it's receiving from the voice that's being spoken, can

05:31:20   7   actually determine the direction from where that sound is

05:31:25   8   coming from and be able to electronically align or steer

05:31:29   9   the microphones to better pick up that particular one

05:31:32   10 and -- and discount the noise that's from the other areas.

05:31:35   11 Q.   Sir, you mentioned some units, noise reduction,

05:31:42   12 beamforming, sound source localization. Are those in any

05:31:44   13 claims?

05:31:45   14 A.   Yes, in fact, that is -- they are in Claim 1.

05:31:53   15   MR. RUBINO: If we can go to the next

05:31:55   16 demonstrative, please.

05:31:57   17 Q.   (By Mr. Rubino) Do you have a better way to look at

05:31:58   18 Claim 1 to make it a little more readable for our -- for

05:32:02   19 our purposes today?

05:32:03   20 A.   Well, I have -- I have taken exactly the words that are

05:32:06   21 shown here that are replicated for Claim 1, and I've

05:32:10   22 created a demonstrative, and I believe it's a little easier

05:32:13   23 to read.

05:32:14   24   MR. RUBINO: Next demonstrative, please,

05:32:16   25 Mr. Thompson.

05:32:19   1   Q.   (By Mr. Rubino)   Is this the demonstrative you were

05:32:21   2   talking about, sir?

05:32:22   3   A.   Yes.   And the reason I created it this way is I wanted

05:32:25   4   to make sure as I went through the discussion of the claim

05:32:28   5   and specifically as it applies to the accused products, I

05:32:31   6   wanted to do this stepping through a claim in a smaller

05:32:33   7   basis, rather than trying to look at the claim as a whole.

05:32:36   8   So what I have done is I have arranged this with

05:32:42   9   the letters A, B, C through F.   And so what I will do as I

05:32:47   10 step through this is to go step-by-step looking at No. --

05:32:52   11 letter A and then B and so forth.

05:32:54   12 Q.   And now, earlier, sir, you said that you applied the

05:32:58   13 Court's claim constructions, right?

05:33:01   14 A.   Yes, that's correct.

05:33:04   15 Q.   And do you have a listing of those here?

05:33:06   16 A.   Yes, I do.   I've created a demonstrative with a listing

05:33:10   17 of the terms.

05:33:12   18   MR. RUBINO: Can we see the next demonstrative,

05:33:15   19 please, Mr. Thompson?   The next demonstrative, please.

05:33:19   20 Thank you.

05:33:20   21 Q.   (By Mr. Rubino)   Can you just give -- give the jury one

05:33:27   22 example of your application of a construction?

05:33:30   23 A.   Sure.   Claim 1 -- when you go back and look at Claim 1,

05:33:38   24 it has a limitation that indicates that certain components,

05:33:41   25 such as a source -- can we go back to the claim, just bring

05:33:48   1   those out.

05:33:48   2   If we look, for instance, at -- under A,

05:33:51   3   Paragraph A, it states that the source -- starting right

05:33:56   4   here -- the source localization -- the sound source

05:34:03   5   localization unit -- might as well get all the words in

05:34:06   6   there.

05:34:07   7   The sound source localization unit, the adaptive

05:34:15   8   beamforming unit, and the noise reduction unit are

05:34:20   9   integrated into what is called a digital signal processor.

05:34:25   10   So these are three components that are part of a

05:34:27   11   digital signal processor.

05:34:28   12   Now, if we can go back to the other slide.

05:34:32   13   So the Court has provided to us a definition for

05:34:39   14   digital signal processor. And that definition is: A

05:34:43   15   microprocessor that is specialized for mathematical

05:34:46   16   processing of digital signals.

05:34:49   17   So what I do is I adopt that claim construction.

05:34:52   18   And so when I read digital signal processor in Claim 1, I

05:34:57   19   can substitute these words, microprocessor that is

05:35:00   20   specialized for mathematical processing of digital signals.

05:35:15   21   Q.   And did you apply that to the -- your analysis of the

05:35:18   22   accused products, sir?

05:35:18   23   A.   Yes, I did. Any one of these claim terms that as it

05:35:21   24   applies to the claims that issued, yes, I did -- did so.

05:35:26   25   Q.   So as to the accused products, which -- which systems

05:35:30	1	did you review?
05:35:31	2	A. I reviewed the Amazon Echo systems. There's a number
05:35:38	3	of different products that fall within that category.
05:35:45	4	Q. Do you have a depiction or a list you can provide of
05:35:48	5	these products?
05:35:48	6	A. Yes. As far as the accused products, I -- I've created
05:35:51	7	a table that identifies what the products are and a little
05:35:55	8	bit about the configuration of the products.
05:35:58	9	MR. RUBINO: May we go to PTX-15 -- PTX- --
05:36:04	10	demonstrative 15, please. Thank you.
05:36:05	11	A. So what I see -- what I've listed here are the accused
05:36:09	12	products. They're identified as the Amazon Echo. The
05:36:14	13	names are across the top. The pictures of them are across
05:36:17	14	the bottom. The Echo, the Echo Dot, the Dot Kids Edition,
05:36:25	15	the Echo Plus, Echo Show, Echo Spot, Echo Studio, and Echo
05:36:31	16	Look.
05:36:31	17	So these are the products that are at issue.
05:36:35	18	As I said, I provided a picture at the bottom as
05:36:38	19	to what they look like. And I've also identified in the
05:36:41	20	center the number of microphones that are associated with
05:36:43	21	each of these products. And you can see that some have an
05:36:47	22	arrangement of seven mics or eight mics or four mics.
05:37:03	23	Q. (By Mr. Rubino) Mr. McAlexander, on the first column,
05:37:06	24	the top left under Echo, you have 1st Gen, 2nd Gen, and
05:37:14	25	3rd Gen, and then some names underneath each of those Gens.

05:37:18   1   Can you explain what that means?

05:37:19   2   A.   Yes.   The -- the internal names, as I understand, that

05:37:19   3   Amazon has ascribed to their products is what I put in

05:37:27   4   parenthesis, such as Biscuit or Donut or Doppler or Sonar,

05:37:33   5   Pancake, and so forth.

05:37:33   6   And what I've listed there is, when I refer to a

05:37:37   7   generation, the 1st Generation is the first product that

05:37:40   8   came out under that particular category called Echo.   And

05:37:44   9   then later they turned out a 2nd Generation and 3rd

05:37:48   10   Generation.   And that's generally what is shown there.

05:37:51   11   Q.   And to the right, you don't have any generation

05:37:57   12   denotations.   What does that mean?

05:37:59   13   A.   I'm sorry, to the right?

05:38:01   14   Q.   On the right side of the table, you don't have any

05:38:06   15   generation denotations?

05:38:09   16   A.   In terms of these three products?

05:38:10   17   Q.   Yes, sir.

05:38:10   18   A.   Yes.   On those three products, as I understanding, that

05:38:14   19   that's -- that is the name.   I have not observed anything

05:38:17   20   that's come out with a different generation of them.

05:38:24   21   Q.   So if we're looking at any of Amazon's documents,

05:38:28   22   what's your understanding if you see a document that says

05:38:32   23   Pancake on it?

05:38:32   24   A.   My understanding is if I see a document that says

05:38:36   25   Pancake on it, that it's referring to the 1st Generation of

05:38:41   1   the Echo Dot type.

05:38:42   2   Q.   Now, in your review earlier, you mentioned that you

05:39:00   3   looked at some marketing materials, website materials of

05:39:02   4   Amazon; is that right?

05:39:03   5   A.   Yes, that's correct.

05:39:04   6   Q.   So how does Amazon describe these products in those

05:39:07   7   materials, as you've observed?

05:39:09   8   A.   Well, I've created a couple of demonstratives to

05:39:12   9   address that.

05:39:19 10   In this first one, this is a demonstrative.   At

05:39:22 11   the bottom -- across the bottom, I've identified where the

05:39:25 12   site for this was on the web.

05:39:27 13   And, specifically, it states in this Amazon file:

05:39:32 14   Echo has seven -- Echo has seven microphones and

05:39:37 15   beamforming technology, so it can hear you from across the

05:39:40 16   room, even while music is playing.

05:39:46 17   And it goes on to say that when you want to use

05:39:49 18   Echo, just say the wake word "Alexa," and Echo responds

05:39:54 19   instantly.

05:39:54 20   And this is what I referred to earlier that the

05:39:57 21   patented inventions are directed to the front end.   It's

05:40:00 22   the speaking of the word "Alexa" and the system responding,

05:40:04 23   that alone I have found infringes the claim.

05:40:08 24   Q.   So this behavior you're speaking of with the Alexa or

05:40:12 25   with the Echo products, have you observed it yourself?

05:40:17   1   A.   Yes.   I have actually tested this with the products

05:40:22   2   that I purchased, yes.

05:40:28   3   Q.   And so you yourself have been an end user of these

05:40:32   4   products, right?

05:40:32   5   A.   I myself have been an infringer, yes.

05:40:35   6   Q.   So can you take us through what an end user would see

05:40:38   7   when using one of these Echo products?

05:40:40   8   A.   Yes, I can.   In fact, the next demonstrative I think

05:40:44   9   will help illustrate that.

05:40:45   10   A number of these products, especially the Echo,

05:40:49   11   the Echo Dot, that you'll see the circular blue ring on the

05:40:53   12   outside.   On the Echo device, that's a tall cylinder,

05:40:57   13   you'll see it on the top.   On the Echo Dot, you'll see it

05:41:01   14   on the top, as well.

05:41:02   15   And the top has some buttons on it, such as the

05:41:05   16   mute button.   You'll also note a ring of orifices or holes.

05:41:11   17   These are basically the conduit through which sound can be

05:41:14   18   carried to the microphones that sit underneath this top

05:41:17   19   inside.

05:41:18   20   But on the outside is a ring -- a blue ring.   When

05:41:22   21   you speak the word "Alexa," the Echo devices will hear

05:41:28   22   that, understand it.   And the reason that you know that it

05:41:30   23   is picking it up is because you will begin to see a -- a

05:41:34   24   blue light appear.

05:41:36   25   And then as it goes through very quickly, its

05:41:42 1 algorithms, it will determine the direction from which that

05:41:45 2 speech is coming.

05:41:46 3   And you will notice on this particular diagram at

05:41:48 4 the bottom of the diagram, the -- the blue is a lighter

05:41:52 5 blue. The lighter blue color is -- is Amazon is Amazon's

05:41:57 6 Echo device pointing to the direction from which the sound

05:42:00 7 is coming.

05:42:01 8   So it has made a determination on where the sound

05:42:04 9 is and has steered the beams internally for the microphones

05:42:08 10 to pick up that direction.

05:42:14 11 Q. And on the left of this demonstrative, you reference

05:42:17 12 PTX-111; is that right?

05:42:18 13 A. That is correct. In this document, it base -- it

05:42:22 14 derive -- it's entitled: All Things Alexa. And you'll see

05:42:27 15 within this document and others that all the Alexa devices

05:42:30 16 operate this way.

05:42:34 17   MR. RUBINO: Mr. Thompson, can you please pull up

05:42:37 18 PTX-111?

05:42:39 19 Q. (By Mr. Rubino) So you said that the top of this

05:42:50 20 document said: All Things Alexa?

05:42:54 21 A. Correct.

05:42:55 22 Q. And does that indicate anything to you about whether

05:42:57 23 this behavior is specific for any -- any Echo version from

05:43:00 24 your chart?

05:43:01 25 A. When it says All Things Alexa, it covers all things

05:43:07 1 Alexa. It's not directed to a particular type, and the

05:43:10 2 valuation I have done of the products would indicates and

05:43:13 3 support that this statement is correct.

05:43:14 4 Q. And, again, this is a document you've also observed on

05:43:29 5 Amazon's website; is that right?

05:43:30 6 A. That is correct, yes.

05:43:35 7   And if you'll notice, at the bottom of the exhibit

05:43:42 8 is the HTTPS URL for that particular document.

05:43:50 9 Q. Now, sir, you said you had some physical products. Can

05:43:53 10 you please tell the jury what you did with those physical

05:44:01 11 Amazon products?

05:44:03 12 A. Yes. Once the physical Amazon products were acquired,

05:44:06 13 I plugged them in, tested them, and then I began to take

05:44:10 14 them apart.

05:44:11 15   In fact, I photographed them first from the box,

05:44:14 16 and then out of the box, and then I took each one of them

05:44:17 17 apart and evaluated and photographed the inside so that I'd

05:44:21 18 understand where the components were located, where the

05:44:29 19 mics were located, how the mics -- microphones -- when I

05:44:31 20 used the word "mic," microphone -- how that -- the

05:44:37 21 microphone is communicated to the digital signal processor

05:44:39 22 chip.

05:44:41 23   MR. RUBINO: Go to the next demonstrative slide,

05:44:48 24 please.

05:44:48 25 Q. (By Mr. Rubino) Sir, what is this a picture of?

05:44:50   1   A.   This is a picture of the Echo, which on my previous

05:44:56   2   chart, was the first column on the chart.   And I've

05:45:00   3   identified that the Echo device is one in which the

05:45:04   4   microphones that sit just below the top of the cylinder is

05:45:10   5   a seven-microphone circular array.

05:45:26   6   Q.   So other than use the device and plug it in, what else

05:45:28   7   did you do with it in your analysis?

05:45:30   8   A.   What I did, as I mentioned before, is I actually then

05:45:34   9   took the unit apart so that I could look at how it was

05:45:37 10   constructed on the inside.

05:45:39 11   Q.   And for this Echo 1st Gen, for example, what did you

05:45:45 12   observe on the inside?

05:45:46 13   A.   Well, what I observed on the inside was, first, just

05:45:50 14   under the top where the buttons were located and the light

05:45:55 15   is located, the light actually is -- is LEDs on a circuit

05:46:03 16   board.   And on that same circuit board are the microphones.

05:46:09 17   Q.   And in your testing, you said that you gave some

05:46:19 18   commands, Alexa, and then witnessed a response to those

05:46:21 19   commands; is that right?

05:46:23 20   A.   That's correct.   And the response being the light

05:46:27 21   turning on and the darker blue and light blue appearing in

05:46:37 22   the direction from which I was speaking.   And then I also

05:46:39 23   observed as I moved around, that that light would move with

05:46:41 24   me.

05:46:41 25   Q.   So apart from looking at the physical device and giving

05:46:47   1   it a voice command, how did you come to understand how

05:46:53   2   those voice commands work?

05:46:55   3   A.   Well, there was a number of documents that were

05:46:57   4   produced in this case that were produced by Amazon that go

05:47:03   5   to showing how -- how the circuits are arranged inside in

05:47:10   6   terms of -- I call it a block diagram, but it shows on a

05:47:14   7   functional basis what is connected to what.

05:47:18   8   And, also, looking at deposition testimony with

05:47:23   9   regard to this.

05:47:26   10   And, thirdly, with regard to source code

05:47:29   11   valuation.

05:47:37   12   MR. RUBINO: Can we go to Slide 20, please?

05:47:40   13   Q.   (By Mr. Rubino)   Sir, is this one of the block diagrams

05:47:45   14   you were talking about?

05:47:46   15   A.   Yes, this is one of the block diagrams.   There are two

05:47:50   16   different sets of code types.   One is called the Doppler,

05:47:57   17   or it's -- it's an audio front end for Doppler.   And this

05:48:01   18   applies to the original Echo generation -- 1st Generation,

05:48:09   19   as well as the Pancake, which is the Dot 1st Generation.

05:48:15   20   And here if we look on the top left side, the --

05:48:19   21   the -- the information that is shown there on the diagram

05:48:21   22   is the microphone array.

05:48:22   23   So this is where the seven-microphone arrays

05:48:27   24   provide information -- provide their input into the

05:48:30   25   remainder of the computer system.

05:48:34   1   And you'll notice that it shows that it has seven

05:48:37   2   inputs. That's -- that's one with the horizontal arrow

05:48:42   3   coming from the microphones.

05:48:44   4   It also says that it does -- it has this input

05:48:47   5   into what's called send-in, and is done at a 16,000 hertz

05:48:58   6   or 16 cycle -- 16,000 cycles per second. So that's the

05:49:02   7   rate in which the information is extracted or inputted into

05:49:04   8   the system.

05:49:04   9   Also, you'll notice that the information for the

05:49:07   10   microphone array passes through filtration. It goes

05:49:10   11   through a component called beamforming.

05:49:12   12   It also has another noise abatement called echo

05:49:17   13   cancellation.

05:49:18   14   It also has a block that is functionally ascribed

05:49:23   15   to voice activity detector. So it's actually extracting

05:49:27   16   out of what is in the -- in the input from the microphones

05:49:30   17   to show that, yes, this is voice.

05:49:34   18   And, lastly, on this chart, it makes a beam

05:49:37   19   selection. So it goes through the process of identifying

05:49:41   20   what the inputs are from the microphones, evaluating those

05:49:46   21   inputs, and from that, determining the direction from which

05:49:50   22   the sound is occurring, and then doing a beam selector to

05:49:54   23   orient and steer the beams in the direction of the sound

05:49:57   24   input.

05:49:58   25   THE COURT: Let me interrupt at this point.

05:49:59	1	I'm aware that Mr. McAlexander has a considerable
05:50:02	2	amount of testimony yet to give, ladies and gentlemen. And
05:50:05	3	I'm not going to keep us any later on a Friday evening.
05:50:09	4	There's not a perfect place to break this testimony, but
05:50:12	5	this is as good as any.
05:50:14	6	So, at this point, we're going to recess until
05:50:17	7	Monday morning.
05:50:20	8	Ladies and gentlemen of the jury, as you leave the
05:50:21	9	courtroom this evening, please leave your closed juror
05:50:24	10	notebooks on the table in the jury room. Please follow all
05:50:27	11	the instructions I've given you about your conduct,
05:50:31	12	including, of course, you would expect me to remind you not
05:50:33	13	to discuss the case with anyone in any way, including the
05:50:36	14	eight of yourselves.
05:50:38	15	I'd like to have you back, in time so that we can
05:50:41	16	start promptly at 8:30 on Monday morning. So please be
05:50:45	17	assembled and in the jury room a short time before 8:30 so
05:50:49	18	that we can begin at that time.
05:50:51	19	Please drive carefully to your homes, have a good
05:50:55	20	weekend. And, at this time, the jury is excused for the
05:50:57	21	weekend.
05:50:58	22	COURT SECURITY OFFICER: All rise.
05:51:24	23	(Jury out.)
05:51:25	24	THE COURT: Be seated, please.
05:51:27	25	You may step down, Mr. McAlexander.

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05:51:29    1              THE WITNESS:   Thank you.

05:51:30    2              THE COURT:   Counsel, is there anything that you're

05:51:32    3   aware of that needs to be raised with the Court before we

05:51:35    4   recess for the evening?

05:51:37    5              MS. TRUELOVE:   Nothing from the Plaintiff,

05:51:38    6   Your Honor.

05:51:38    7              MR. DACUS:   Nothing from the Defendant,

05:51:40    8   Your Honor.

05:51:40    9              THE COURT:   All right.   I'll remind you that I'll

05:51:42   10   be available Monday morning in chambers by 7:30 if there

05:51:48   11   are disputes that need to be resolved or guidance that

05:51:52   12   needs to be given.

05:51:52   13              I did not miss having to do that this morning, and

05:51:53   14   I appreciate not having to do that this morning, but we'll

05:51:53   15   see what Monday brings.

05:51:55   16              I'll also remind you to be prepared to read into

05:52:00   17   the record Monday morning the items from the list of

05:52:04   18   pre-admitted exhibits used during today's portion of the

05:52:06   19   trial, and we'll do that before I bring in the jury.

05:52:08   20              Unless there's something else, counsel, we stand

05:52:11   21   in recess until Monday morning.

05:52:13   22              COURT SECURITY OFFICER:   All rise.

05:52:15   23              (Recess.)

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1   CERTIFICATION

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3   I HEREBY CERTIFY that the foregoing is a true and

4   correct transcript from the stenographic notes of the

5   proceedings in the above-entitled matter to the best of my

6   ability.

7

8

9   __/S/ Shelly Holmes_____   __10/2/2020___
     SHELLY HOLMES, CSR, TCRR   Date
10   OFFICIAL REPORTER
     State of Texas No.: 7804
11   Expiration Date: 12/31/2020

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